HEARING TO REVIEW RENEWABLE FUELS STANDARD IMPLEMENTATION AND AGRICULTURE PRODUCER ELIGIBILITY

HEARING

BEFORE THE

SUBCOMMITTEE ON CONSERVATION, CREDIT, ENERGY, AND RESEARCH

OF THE

COMMITTEE ON AGRICULTURE HOUSE OF REPRESENTATIVES

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CONTENTS

HEARING TO REVIEW RENEWABLE FUELS STANDARD IMPLEMENTATION AND AGRICULTURE PRODUCER ELIGIBILITY

THURSDAY, JULY 24, 2008

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON CONSERVATION, CREDIT, ENERGY, AND RESEARCH,
COMMITTEE ON AGRICULTURE,
Washington, D.C.

The Subcommittee met, pursuant to call, at 10:02 a.m., in Room 1300 of the Longworth House Office Building, Hon. Tim Holden [Chairman of the Subcommittee] presiding.

Members present: Representatives Holden, Herseth Sandlin, Cuellar, Ellsworth, Space, Boyda, Gillibrand, Donnelly, Peterson (*ex officio*), Lucas, King, Fortenberry, Moran, and Goodlatte (*ex officio*).

Staff present: Nona Darrell, Adam Durand, Anne Simmons, Kristin Sosanie, Kevin Kramp, Josh Maxwell, Rita Neznek, and Jamie Weyer.

OPENING STATEMENT OF HON. TIM HOLDEN, A REPRESENTATIVE IN CONGRESS FROM PENNSYLVANIA

The CHAIRMAN. This hearing of the Subcommittee on Conservation, Credit, Energy, and Research to Review Renewable Fuel Standard implementation and agriculture producer eligibility will come to order. I would like to thank the witnesses for being here, and I look forward to their testimony.

Today we are going to look at issues surrounding the implementation of the Renewable Fuel Standard and agricultural eligibility.

It is often said that the Agriculture Committee is the most bipartisan Committee, and I think the recently passed farm bill proved that with real differences falling along regional rather than partisan lines. Successful agricultural policy must therefore recognize that farmers, ranchers, and foresters throughout the country have a wide range of need. And we must work to help each of them in their local environment.

Likewise, if the Renewable Fuel Standard is to be a success, it must be flexible and address the realities that all agriculture producers face throughout the country regardless of location. In these times of record energy prices, it is critical that we take advantage of our agricultural and natural resources as we move towards energy independence.

The Agriculture Committee and Congress overwhelmingly supported renewable energy programs in the 2008 Farm Bill, making historic investments in research, development, and production. The RFS that passed in December guarantees a market for renewable biofuel production as our homegrown alternative to foreign oil.

But without a clear and workable regulatory framework, it is likely that the RFS will be unworkable for many regions and inadvertently introduce uncertainty in the market for investment and second generation biofuels. Uncertainty during this pivotal time will delay and threaten the aggressive targets set for RFS and hold us back from achieving energy independence.

There is concern that unnecessary restrictions in the definition of *renewable biomass* will severely limit the majority of private forestland owners from participating in the RFS. This will leave out entire regions of the country, including my home State of Pennsylvania, where most of the forestland is unlikely to be classified as an actively managed tree plantation.

Responsible feedstock harvesting on public and private land is critical for the widescale biofuel production and the rural communities they support. Likewise, there are questions about the processes for determining and enforcing RFS lifecycle greenhouse gas emissions regulations. It is important for the emerging second generation biofuels industry that we get these regulations right. I believe that farmers will continue to be stewards of the land in addition to safely and reliably producing food, fiber and renewable energy.

As our economy diversifies its energy supply, I strongly believe that agriculture producers in rural communities will play an important role during this transition. I hope this hearing serves as an opportunity to learn about some of the challenges and opportunities we face during the Renewable Fuel Standard implementation.

I look forward to hearing from our witnesses today, and I call on my friend, the Ranking Member from Oklahoma, Mr. Lucas.

OPENING STATEMENT OF HON. FRANK D. LUCAS, A REPRESENTATIVE IN CONGRESS FROM OKLAHOMA

Mr. LUCAS. Thank you, Mr. Chairman, for calling today's hearing so that we can review the EPA's implementation of the Renewable Fuel Standard.

Oklahoma has long been known for its energy production from oil and gas fields. However, the potential for renewable energy production from my home state is endless. In my district alone, we provide animal and plant based corn crops for conventional ethanol and land gross cellulosic crops from switchgrass to help meet those RFS mandates.

During the development of the recently enacted farm bill, I worked with Chairman Peterson and yourself, Mr. Chairman, to craft an energy title that would help provide new markets for agricultural crops and enhance the economic development of our rural areas. Our energy title will help producers transition to cellulosic crop production, incentivize the purchase of these crops during the development stage, provide guaranteed loans to build cellulosic ethanol plants, and provide assistance to ethanol plants for the use of biomass for repowering.

The energy title this Committee developed will help with the transition away from food to fuel as an energy source so that we can meet the RFS. However, I am concerned that provisions in the RFS restrict new lands from growing cellulosic crops. Currently producers are seeing record prices for the crops, and unless they can open up new land, they will have no incentive to grow cellulosic crops.

In addition, the increase in the RFS is adversely affecting or impacting the availability and the price of feed grains for our livestock producers. In the 2007 first quarter of the U.S. corn crop was directed literally—well, I should say ¼ of the corn crop was directed to ethanol production. The EPA has the authority to waive the RFS requirement when the implementation of the requirement would adversely harm the environment or the economy.

I believe the EPA needs to take a hard look at the impacts that the mandate is having on livestock producers. We need to place more emphasis on developing advanced biofuels, such as cellulosic biofuels, to meet the RFS mandate. By continuing to diversify our biofuels production, we can alleviate the pressure that is being placed on the agricultural supply and price concerns associated with corn ethanol.

Again, Mr. Chairman, thank you for calling this hearing, and I look forward to what we hear today.

The CHAIRMAN. The chair thanks the Ranking Member and would request that all of the Members submit their opening statements for the record.

[The prepared statements of Mr. Peterson, Salazar, and Graves follow:]

PREPARED STATEMENT OF HON. COLLIN C. PETERSON, A REPRESENTATIVE IN CONGRESS FROM MINNESOTA

Thank you Mr. Chairman. Thank you for calling this hearing.

Much of what we do here in the Agriculture Committee is about finding the balance between the diverse needs and situations in American agriculture. With so many different sectors overlapping to create farm, food and energy policy, we're used to working carefully to move the country forward in the best way possible—for everyone involved.

I've said it many times before, but this is an exciting time for American agriculture. Rural America has the opportunity to move us toward energy independence by producing agriculturally-based bioenergy here at home. The Renewable Fuel Standard will help ensure that we move towards the next generation of advanced biofuels as we expand domestic production.

I remain concerned about some of the language included in the final RFS legislation. And throughout the implementation process, I expect the EPA to consult with the USDA on issues that involve the production of feedstocks and use the resources at land-grant universities and the Department.

But that is why it's important to have hearings such as this one to get these issues out in the open and ensure that the final result is workable for all feedstock producers. I look forward to hearing from the witnesses and thank you all for coming today.

PREPARED STATEMENT OF HON. JOHN T. SALAZAR, A REPRESENTATIVE IN CONGRESS FROM COLORADO

Good morning, I would like to thank Chairman Holden and Ranking Member Lucas for holding this important hearing.

I also want to thank the witnesses of the two panels for coming to testify. The information you provide is vital to continue the conversation on reducing greenhouse gas emissions and becoming energy independent.

We can all agree that we need more diversified and reliable sources of energy.

The creation of the Renewable Fuel Standard helped bring other sources to the forefront, such as corn-based ethanol and biodiesel production.

As a rancher and a Coloradoan, I am extremely proud of both of these resources.

In 2007, corn production was a record 13.1 billion bushels. While this increase has helped producers, farmers across America have received backlash regarding the food *versus* fuel debate.

At the same time, biofuel production remains a key component of our energy independence.

In my district, the San Juan Bioenergy project is set to open by this summer's end.

Biodiesel provides economic opportunities for farmers by creating a value added crop. For example, San Juan Bioenergy will be creating biodiesel from sunflower and canola oils.

We need to encourage more projects like the one in my district.

While considering the RFS, its definitions, and implementation, we need to continue to look at the big picture.

The mandates set by the RFS can be costly, so consideration regarding their execution should be taken seriously.

With that said, I am anxious to hear the thoughts of our panelists as they discuss these issues.

Again, thank you Mr. Chairman and Ranking Member.

PREPARED STATEMENT OF HON. SAM GRAVES, A REPRESENTATIVE IN CONGRESS FROM MISSOURI

Thank you, Chairman Holden and Ranking Member Lucas for holding this hearing on the implementation of the Renewable Fuel Standard.

The Renewable Fuel Standard will provide our nation with an alternative, domestically produced fuel that can help alleviate our reliance on foreign oil. The United States needs to become more self-sufficient in energy production, and the best way to do that is to promote the development of alternative fuels.

The United States consumes roughly 20 million barrels of oil a day. Relying on imported oil makes our economy and national security vulnerable to foreign governments, some of which are hostile to U.S. interests. The Renewable Fuel Standard not only reduces our reliance on foreign sources of fuel, but it is also good for farmers and the environment.

The United States should continue to promote the use of alternative, domestically-produced fuels such as biodiesel and ethanol. Fortunately, farmers in Missouri and across the nation have expanded the ethanol industry at a record pace. Now it is time we see the quick implementation of these policies and work toward developing the infrastructure to make the Renewable Fuel Standard successful and withstanding.

Quickly implementing and further exploring uses for alternative fuels is good for the country, and I look forward to working with my colleagues to achieve these goals. Again, I would like to thank the Committee for holding this hearing.

Thank you.

The CHAIRMAN. We would like to welcome our first panelist, the Hon. Robert Meyers, Principal Deputy Assistant Administrator for the Office of Air and Radiation from the United States Environmental Protection Agency. Mr. Meyers, you may begin when you are ready.

STATEMENT OF HON. ROBERT J. MEYERS, PRINCIPAL DEPUTY ASSISTANT ADMINISTRATOR, OFFICE OF AIR AND RADIATION, U.S. ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C.; ACCOMPANIED BY WILLIAM "BILL" HAGY III, DEPUTY ADMINISTRATOR FOR BUSINESS PROGRAMS, OFFICE OF RURAL DEVELOPMENT, U.S. DEPARTMENT OF AGRICULTURE

Mr. MEYERS. Thank you, Mr. Chairman and Members of Subcommittee, and I appreciate the opportunity to be here today talk-

ing about our implementation of the Energy Independence and Security Act and its provisions regarding biofuels.

The EPA is responsible for implementing the RFS program, which was originally established in the Energy Policy Act of 2005 as Section 211(o) of the Clean Air Act. Since EISA was enacted in December 2007, the Agency has been working very hard to develop an effective program under the new and amended RFS provisions which we commonly refer to as RFS2.

In this regard, Agency staff has met with more than 30 different stakeholders including renewable fuel producers, technology companies, petroleum refiners and importers, agricultural associations, owners associations, environmental groups, gasoline and petroleum marketers, pipeline owners, and fuel terminal operators.

We also continue to meet and collaborate regularly with the Departments of Energy and Agriculture as well as the Forest Service. EPA can and will draw from its experience in developing the original RFS regulations. It is important to understand that EISA has made a significant number of changes to the RFS program.

First EISA increased the total renewable fuel volume mandate fivefold over the 2005 Energy Bill and extended the statutory deadline scheduled for the RFS by 10 years. Therefore development of substantial infrastructure capable of delivering, storing, and blending these volumes of renewable fuels in new markets and expanding existing market capabilities will be needed.

Second, the EISA extended the RFS program to include both on-road and nonroad gasoline and diesel fuel volumes. Extending the program to producers and importers of on-road and nonroad gasoline and diesel fuel was a significant change and may affect many new parties including some small businesses.

Third, EISA increased the number of renewable fuel category standards to a total of four, including total renewable fuel, and subcategories, each with its own required minimum bottoms, advanced biofuels, biomass-based diesel and cellulosic fuels.

EISA also specifies that by 2022, cellulosic volumes should exceed the volumes required for what might be termed as conventional corn-based ethanol.

Fourth, new provisions are included in EISA that require EPA to apply lifecycle greenhouse gas performance standards to each category of renewable fuel. Lifecycle greenhouse gas emissions is a defined term under the Act and generally refers to the aggregate quantity of greenhouse gas emissions related to the full fuel lifecycle, including all stages of fuel and feedstock production distribution.

There being separate elements and complexities of this definition, EPA is presently working with our interagency partners to develop appropriate approaches. In general, work is necessary on lifecycle with respect to the modeling framework, better understanding of GHG emission sources, and development of key components for the agricultural sector, biofuel production, and baseline petroleum fuel. While EPA has done considerable work in this area, additional new and improved analysis will be necessary.

Fifth, EISA adds a number of new provisions, including changing the definition of *renewable fuel feedstocks* in a fundamental manner. Developing appropriate enforceable regulations addressing this

provision will require extensive dialogue with USDA, USDR, DOE, the agricultural community, and the renewable fuel producers, and others.

Finally, as required by Congress, we will be assessing the impacts of EISA Renewable Fuel Program on vehicle emissions, air quality, greenhouse gases, water quality, land use, and energy security. These analyses will provide important information to the public and Congress on the effectiveness of the new legislation.

With respect to other implementation issues, as I am sure you are aware, Texas Governor Rick Perry sent a letter to EPA Administrator Johnson on April 25 requesting a partial waiver of the 2008 RFS volume obligations. The comment period for this request closed on June 23, and we have received approximately 15,000 comments with 150 substantive comments from a wide range of stakeholders including: individual companies and associations; farmers, cattle, beef, and poultry industries; the food and grain industries; and others.

We are actively evaluating these comments and other pertinent information. However, it is clear that some additional time is needed to allow us to accurately review and respond to public comments and to develop a decision document that explains the technical, economic, and legal rationale for our decision.

We will be using this time to continue our coordination, as required by EISA, with USDA and DOE, and I am confident the agency will be able to make a final determination on the waiver request by early August of this year.

In closing, EPA is faced with many challenges with the development of regulations to implement the RFS2. We are attempting to utilize the successful approach we employed in developing the regulations for the original RFS program. I look forward to working with Members of Congress and this Committee and many other stakeholders during this process. Thank you very much.

[The prepared statement of Mr. Meyers follows:]

PREPARED STATEMENT OF HON. ROBERT J. MEYERS, PRINCIPAL DEPUTY ASSISTANT ADMINISTRATOR, OFFICE OF AIR AND RADIATION, U.S. ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C.

Mr. Chairman and Members of the Subcommittee, I appreciate the opportunity to come before you today to testify on implementation of the renewable fuel provisions of the Energy Independence and Security Act of 2007 (EISA). The Act's aggressive new Renewable Fuel Standard (RFS) will further our nation's goals of achieving energy security and reducing greenhouse gases by building on the successful RFS program established by the Energy Policy Act of 2005 (EPAct 2005).

Renewable fuels are a key element of a national strategy for addressing our energy security and the challenge of global climate change. The national Renewable Fuel Standard, in combination with the vehicle fuel economy standards in EISA, will reduce emissions of greenhouse gases in the transportation sector and improve our energy security. The changes brought about by EISA are expected to prevent the release of billions of metric tons of greenhouse gases emissions into the atmosphere over the next several decades.

The Environmental Protection Agency is responsible for implementing the RFS program, and we are proud of our success to date in working with stakeholders in industry, states and the environmental community to build an effective program for increasing the volumes of renewable fuel used by the transportation sector. In April 2007 we announced final regulations for implementing the RFS Program under EPAct 2005. The Agency worked very closely with both our Federal partners and stakeholders to develop broad support for the program. This program was officially

launched in September 2007. We believe our success is grounded on our close collaboration with stakeholders on the design and implementation of the program.

Since EISA was signed into law on December 19, 2007, the Agency has been working diligently to develop regulations to implement the new RFS program established by that legislation, commonly called RFS2. Our first and most pressing task was to issue a new renewable volume standard for 2008. The RFS program established by EPAct 2005 required 5.4 billion gallons of renewable fuel in 2008. The EISA legislation increased the standard to 9 billion gallons in 2008, with annual increases in mandated volumes resulting in 36 billion gallons being required in 2022. We published a notice implementing the 2008 volume requirement in the *Federal Register* on February 14 of this year.

While the RFS program established under EPAct 2005 provides a solid foundation for the new regulations, RFS2 includes new elements which add complexity to the program. As a result, the new EISA provisions require careful evaluation and considerable new analysis.

In this new undertaking, the Agency is following much of the same approach we used in developing the first RFS program. This includes obtaining critical input from our stakeholders throughout the rulemaking process. Since EISA was enacted less than 7 months ago, the Agency has met with more than thirty different stakeholders, including renewable fuel producers, technology companies, petroleum refiners and importers, agricultural associations, environmental groups, gasoline and petroleum marketers, pipeline owners and fuel terminal operators. Agency technical staff have participated in numerous conferences and workshops, which have allowed us to reach a broad range of technical, programmatic and policy issue experts. We also continue to meet and collaborate regularly with the Departments of Energy and Agriculture. Through these meetings, EPA has sought input on the key RFS2 program design elements as highlighted in this testimony.

While EPA will draw from its experience in developing the original RFS regulations, it is important to understand that EISA made a significant number of changes to the RFS program. First, as mentioned previously, RFS2 increases the total renewable fuel volumes mandated to 36 billion gallons a year by 2022. This is nearly a five fold increase over the 7.5 billion gallons a year mandated under EPAct 2005 for 2012, and constitutes a 10 year extension of the schedule provided for in that legislation. EPA believes that the implications of this substantial increase are not trivial. Development of infrastructure capable of delivering, storing and blending these volumes in new markets and expanding existing market capabilities will be needed. In addition, the market's absorption of increased volumes of ethanol will ultimately require new "outlets" beyond E10 blends (i.e., gasoline containing 10% ethanol by volume). A rule of thumb estimate is that E10 blends, if used nationwide, would utilize approximately 15 billion gallons of ethanol. Accommodating approximately an additional 20 billion gallons of ethanol-blended fuel is expected to require an expansion of the number of flexible-fuel E85 vehicles and their utilization of E85 and/or other actions. New emerging renewable fuel production technologies may hold potential to make gasoline and diesel-like fuels from renewable sources. The Agency will continue to monitor and evaluate the development of such technologies as we implement the RFS program over the coming years.

Second, beyond the significant increase in the volume mandate, EISA extended the RFS program to include both non-road gasoline and diesel fuel volumes. Under the regulations implementing EPAct 2005, RFS volume requirements were applied only to producers and importers of on-road gasoline. The extension of this program to both non-road gasoline and diesel fuel volumes, along with the potential for opt-in by participants of the home heating oil and jet fuel markets is a significant change that may affect new parties, including a number of small businesses that have not been regulated under this program in the past.

Third, EISA has established new categories of renewable fuel. EPAct 2005 established standards for two categories of renewable fuels: one standard for the total volume of renewable fuel; and a second standard for cellulosic ethanol requiring 250 million gallons beginning in 2013. RFS2 increased the number of renewable fuel categories and standards to a total of four, including total renewable fuel and three new categories within that with unique volume requirements: advanced biofuels, biomass-based diesel and cellulosic biofuels. Industry will be required to demonstrate compliance with the four separate fuel standards. This will likely require the obligated parties, producers and importers, to forge new business relationships and contracts that are necessary to guarantee their compliance with the new standards. Establishing the necessary systems to track and verify the production and distribution of these fuels and demonstrate compliance with four separate standards will also require sufficient lead time to design and implement these new tracking systems. As in the current program under EPAct 2005, in the near term, some par-

ties may not be able to comply by blending the renewable fuels, and thus may need to purchase or trade credits for the appropriate number and category of fuels to satisfy their volume obligations. It will be very important to conduct effective outreach with these parties to support a smooth implementation. In addition, certain requirements in RFS2 pertain only to renewable fuel production facilities that commence construction after the legislation was enacted. EPA will need to carefully consider how this new provision should be interpreted.

As part of its restructuring of the renewable fuel mandate, EISA increased the cellulosic biofuel mandate from 250 million to 1.0 billion gallons by 2013, with additional yearly increases to 16 billion gallons in 2022. EISA also provided a new definition of this fuel: cellulosic biofuel must be derived from renewable biomass, which includes requirements that place various limitations on the types of land from which the feedstocks are taken, and a cellulosic biofuel must also have lifecycle greenhouse gas emissions that are at least 60 percent less than the baseline lifecycle greenhouse gas emissions for petroleum based fuel (RFS2 established the baseline year as 2005).

Implementing these requirements will entail additional work by EPA as it develops its upcoming regulation. For example, the Act authorizes EPA in certain circumstances to adjust the cellulosic biofuel standard to a level lower than that specified in the law. However it requires in this circumstance that the Agency also make credits available for compliance purposes and provides instructions on how to establish a specific price for these credits. The Agency will therefore need to address several critical issues, such as the quantity of credits to be generated, to whom they will be available, the extent to which they can be traded, and the life of the credit.

RFS2 also established for the first time minimum volume standards for biomass based diesel fuel. These standards begin in 2009 at a half billion gallons and ramp up to 1 billion gallons per year in 2012 and thereafter. To qualify as biomass based diesel, the renewable fuel portion of the biomass based diesel blend must result in greenhouse gas emissions that are at least 50 percent lower than the baseline GHG emissions for petroleum based diesel fuel (RFS2 established the baseline year as 2005) and cannot be co-processed with a petroleum feedstock.

Fourth, EISA requires the Agency to apply lifecycle greenhouse gas (GHG) performance threshold standards to each category of renewable fuel. Congress provided a specific definition of lifecycle analysis that requires EPA to consider all stages of fuel and feedstock production and distribution, from feedstock generation or extraction through the distribution and use of the finished fuel to the ultimate consumer. The Act also specifies that EPA take into account both direct emissions and significant indirect emissions such as emissions from land use changes.

EPA is currently developing a methodology that meets the EISA requirements. This effort builds on a substantial amount of work the Agency has done in this area, beginning with our analysis of the lifecycle GHG impact of the renewable fuel volumes required by the RFS1 program. EPA has expanded the methodology to include secondary agricultural sector impacts and land use changes. The Agency is continuing to further refine and improve our analyses as we prepare to implement the statute's lifecycle GHG performance thresholds.

Given the importance of lifecycle analysis to the success of the RFS2 program and the complexity of this work, the Agency has been working closely with stakeholders. Through multiple meetings with a broad range of groups—including the Departments of Energy and Agriculture, academics and lifecycle experts, environmental organizations, renewable fuel producers, and refiners—we have shared our approach and sought input on the key assumptions and modeling tools necessary to conduct a complete lifecycle analysis that meets the EISA criteria. These discussions have been extremely valuable to the Agency and we plan to maintain this high level of stakeholder engagement throughout the rule development process.

Fifth, RFS2 added a number of other new provisions, including changing the definition of renewable fuel feedstocks in a fundamental manner. The new law limits the crops and crop residues used to produce renewable fuel to those grown on land cleared or cultivated at any time prior to enactment of EISA, that is either actively managed or fallow, and non-forested. EISA also requires that forest-related slash and tree thinnings used for renewable fuel production pursuant to the Act be harvested from non-Federal forestlands. Developing appropriate and enforceable regulations addressing these provisions requires extensive dialogue with USDA, USTR, the agricultural community and renewable fuel producers to better understand current practices and changes in practices that can be developed, implemented and enforced. The Agency has started these discussions and plans to continue this dialogue throughout the regulatory process.

Finally, in support of the rulemaking, we are assessing the many impacts of the EISA renewable fuel program. Assessments are underway to understand the im-

pacts on emissions and air quality (greenhouse gases, ozone, particulate matter and toxics), water impacts (including water quality and consumption), agricultural sector impacts (including direct and indirect land use change), energy security, and economic impacts (such as cost of fuels and feedstocks). Detailed information will be needed for the draft regulatory impact analysis (RIA), which we intend to release with the proposed rules. These analyses will provide important information to the public and Congress on the many anticipated impacts of the new legislation.

As you are aware, Texas Governor Rick Perry sent a letter to EPA Administrator Johnson on April 25 requesting a partial waiver of the 2008 RFS volume obligations required by EISA. Governor Perry requests the volume requirement be reduced by 50 percent, from 9 billion gallons in 2008 to 4.5 billion gallons. This waiver request states that the mandate is having an "unnecessarily negative impact on Texas' otherwise strong economy while driving up global food prices". Under authority and direction provided in EPAct 2005 and EISA 2007, the Agency has 90 days from the date of receipt of this request to issue a decision. We issued a *Federal Register* notice on May 22, requesting public comment on this request. The comment period closed on June 23. We received over 15,000 comments, with over 150 substantive comments from a wide range of stakeholders including individual companies and associations representing renewable fuel producers, farmers, cattle, beef and poultry industries, the food and grain industries and many others. We have been evaluating these comments and other pertinent information and conducting the analysis necessary to support a decision by the Administrator. Of course, EPA is also consulting extensively with our colleagues at the Departments of Agriculture and Energy.

EPA has also been closely monitoring the aftermath of the Midwest floods to determine to what extent this natural disaster may impact the renewable fuel program. We have had multiple discussions with the USDA, DOE, renewable fuel producers, oil companies, petroleum marketers and state authorities. We are evaluating both impacts on feedstock (*e.g.,* corn, soybeans, *etc.*) availability for use in ethanol production, as well impacts on fuel production and distribution systems. The extent of these impacts has not yet been fully determined. If there are short term impacts to ethanol production and distribution, the RFS program provides certain flexibility. For example, obligated parties may comply over the course of a 1 year period, allowing use of excess and previously generated credits. We will continue to coordinate and collaborate with DOE and USDA closely on these issues as directed by the statute and provide updates on this as necessary.

In closing, the Agency is moving forward with the development of regulations implementing the RFS2 provisions and is utilizing the successful approach we employed in developing the regulations for the original RFS program. We look forward to working closely with Members of Congress and our many other stakeholders during this process.

Thank you, Mr. Chairman, and Members of the Subcommittee for this opportunity. This concludes my prepared statement. I would be pleased to answer any questions that you may have.

The CHAIRMAN. Thank you, Mr. Meyers. So on Governor Perry's request for a waiver, you said by early August, you believe that there will be decision that will be made?

Mr. MEYERS. Yes.

The CHAIRMAN. Okay, thank you. Mr. Meyers, the energy bill contained a specific definition of *lifecycle analysis for greenhouse gas emissions*, and as you mentioned in your testimony, this requires EPA to consider all stages of fuel and feedstock production. How does EPA plan to proceed on this? Do you think that you will have to go on the farm to measure and monitor this? And have you been working closely with the Department as you move forward on this?

Mr. MEYERS. First of all, yes, we have been working very closely with USDA and also Department of Energy, who has one of the models that we utilize, the GREET model, to measure lifecycle greenhouse gas emissions. This is a new task for the agency.

It is a mandatory task under the Act, but essentially the legislative language focuses on the aggregate quantity of greenhouse gas emissions. So I think the intent of your question was whether we

would need to go into each individual farm or each individual production facility to determine what their specific greenhouse gas lifecycle profile is.

We don't anticipate doing that. I think the practicality of the situation calls for an averaging approach in terms of different categories of greenhouse gas. We will need to calculate it. We will need to give full faith and credit to the legislative language, but we believe we can use an averaging approach so we won't be looking at individual facilities.

The CHAIRMAN. Mr. Meyers, how is EPA interpreting the *actively managed tree plantations* in the immediate vicinity language in the definition of *renewable biomass*? And what issues have you encountered while trying to determine what these terms mean?

Mr. MEYERS. You are pointing out one of the challenges of interpreting this entirely new legislative language. We are looking at that, and we will be—obviously we are at pre-proposal stage. At proposal stage, we will be taking comment on those definitions, normal rules of statutory interpretation, plain meaning of the statute. We believe we can work with our state colleagues. We are having discussions with regard to those terms, but we will be proposing and taking comment on all those terms.

The CHAIRMAN. Mr. Meyers, I mentioned uncertainty in my opening statement. What can you do to minimize the level of regulatory uncertainty in the market with greenhouse gas emissions reductions and the potential liability issues surrounding ineligible feedstocks in the supply chain, so as not to discourage the private investment needed to meet the aggressive RFS targets?

Mr. MEYERS. Well, I think our experience with RFS1 and the way we developed regulations there helped a lot in terms of even before we proposed the regulations, I think outreach to the community, the effected community, regulated community is essential in the matter, and that is exactly what we are doing in the RFS2.

But certainly in marketplaces, we envision that—again we are pre-proposal, but we envision using some of the same structures we have already put in place in RFS1. In other words, structures such as the RIN, renewable numbers that basically track and will identify the quantities of renewable fuel moving to the system.

We have also used, tried to parallel the existing transfer documents that are used in the industry, the fuel industry. In each type, relying on existing market structures and relying on the existing regulatory structure will help with uncertainty while noting that we have the challenges here with the entirely new categories of fuel that will have to be incorporated into the system.

So I think it is a combination of outreach, and I think it is also a combination of building on the existing regulatory structure we already have.

The CHAIRMAN. Thank you, Mr. Meyers. Before calling the Ranking Member, I see the Chairman of the full Committee has arrived. Does the Chairman have an opening statement? Okay, the gentleman from Oklahoma.

Mr. LUCAS. Thank you, Mr. Chairman. Mr. Meyers, meeting the new renewable fuels mandate will require a tremendous amount of renewable feedstock from a variety of sources. It appears unfortunately that the RFS includes some very specific restrictions on

what agriculture and forest biomass can be used to meet the RFS. Do you believe it is possible to meet the mandate with the restrictions as they appear to be now?

Mr. MEYERS. Is the question with reference to the immediate year or in the future?

Mr. LUCAS. Where you are headed, yes.

Mr. MEYERS. Well, there are going to be challenges, as I noted in my opening statement. The cellulosic volumes contemplated will be, by the end of the program, over the amount of existing corn-based fuel. Cellulosic doesn't exist in commercial quantities in the marketplace right now, so obviously that is a huge endeavor. The Department of Energy is investing in a lot of energy research related to cellulosic, but in essence, you have a mandate anticipating the development of fuel that is not available in large quantities right now. Now, Congress obviously had a plan to incentivize that production, but that will be a challenge.

Additionally, in terms of implementing the bill, there are some challenges with the complexity. I think we can meet them, but, we will—the other broad challenge—will be incorporating. We have gone essentially—jumped up the original schedule from 2005 to 9 billion this year and 11.1 billion next year. At about 15 billion of ethanol, you reach essentially what many people call the blend law, which is essentially saturation of the E10 ethanol blend to level.

So beyond that, there are going to be additional responses required in the marketplace, either higher blend of fuels like E85 or the availability of intermediate blends above E10 if you are an ethanol-based system.

So there are going to be challenges. We have available authority to address those challenges in the statute. The various waiver mechanisms—in addition to the one that Governor—we have a petition from Governor Perry specific to cellulosic volumes, for example. So we feel optimistic that we can make this system work.

Mr. LUCAS. So I guess my follow-up question would be you have looked then at the impact or tried to project or thought about the impact that the mandate will have on the particular markets, the food segment, the feed segment, and the livestock, the fiber segment?

Mr. MEYERS. Yes, a lot of that analysis will be contained in the regulatory impact analysis we will do in association with developing the proposed regulations. We are looking at a number of impacts. The fuel distribution system is one of them that we did quite a bit of work on RFS1, and we are continuing that over now in the RFS2. But a lot of the economic analysis, environmental analysis, public health analysis from air quality standpoint, will be associated with the draft regulatory impacts assessment and the final regulatory impact assessment with the final regulation.

Mr. LUCAS. But the key being that they will be a factor in the equation. Thank you, Mr. Chairman.

The CHAIRMAN. The chair thanks the Ranking Member and recognizes the Chairman of the full Committee, Mr. Peterson.

Mr. PETERSON. Thank you, Mr. Chairman. Thank you and the Ranking Member for holding this hearing. I want to follow up on this. You know, in a way, is there any definition that you have to do on this language here where there are planted crops and crop

residue, harvested from agricultural land, whether they are cultivated any time prior to enactment? Is there some kind of process going on where you are refining that or defining it or whatever?

Mr. MEYERS. Yes, we will essentially have to take that legislative language and operationalize it to regulatory language.

Mr. PETERSON. Where are you in that process? Have you started that at all?

Mr. MEYERS. Yes, EISA was passed December 17 or 19 of last year, and literally almost immediately afterwards, we started working—our office, their office, the Office of Transportation and Air Quality in particular has been working in association with our legal folks and with the other departments and agencies. So we are anticipating to have a proposed rule out this fall, which will address those basic type of issues in the program.

Mr. PETERSON. Are you consulting with USDA on this?

Mr. MEYERS. Yes, we are. I don't want to say a daily basis, but almost a daily basis.

Mr. PETERSON. And the rule is going to be out in September?

Mr. MEYERS. We would hope for September, but need to go through an interagency process. So I think our target is certainly this fall.

Mr. PETERSON. So there has been no public comment on this yet because you haven't put anything out?

Mr. MEYERS. No, there has not been official public commentary, which, of course, will occur. But what we have done, as we did in RFS1, is do a lot of outreach. We have done a lot of informal meetings. We have done a lot of formal meetings. I have sat in and talked to different producers myself, and my staff has been available for multiple meetings.

Mr. PETERSON. Well, what have you heard?

Mr. MEYERS. I think, like most people looking at the law, it took people awhile to start to read it and try and interpret it and figure out what it meant for them. That is a natural question if you are either a field producer or you are somebody who is going to be an obligated party under the bill.

And once that occurs, people start thinking about how the language could be interpreted to take the realities of their situation into account. So we have productive discussions. I think we have actually learned a lot through this process, but it is ongoing. That is all I can say. And the conversations will extend past the proposed rule.

Mr. PETERSON. Well, I don't know if I fully understand this, but—and maybe I am overreacting. But my assessment of this is if this is implemented the way I think it might be implemented, in my opinion, cellulosic ethanol will never happen in this country.

It is almost as crazy as what the Europeans are doing where they are putting sustainability ahead of anything else in terms of developing their biofuels. And having been through the ethanol thing for 40 years, I will guarantee you that you will make sure this will never happen if you limit this land because there is not a market for this stuff. It is a hell of a lot harder to do than anybody realizes. The biggest issue with this whole cellulosic thing is the biomass, and I don't think people understand it.

And if you put restrictions on this, this isn't going to happen. So I want cellulosic to happen, but there are some people here with ideologies that are run amuck in my opinion. And somebody better get real here if we really want to make this happen. I don't know if anybody else has expressed that to you, but I will now so——

Mr. MEYERS. Well, I think we have an interest, as anybody else does, in having a workable transparent system for this fuel standard. I think we are obviously implementing legislative language that we need to give full faith to. So there are terms that pose challenges in the legislative language. I think that is plain. We will do our best to make a workable system, but we also have to live within the laws as is passed.

Mr. PETERSON. Well, yes. Well, some of us are trying to change this. I think this is a big mistake, and if we really want to make this happen, we are going to have to sort through this somehow or another.

The CHAIRMAN. All right, I thank the Chairman. And recognize the gentleman from Iowa, Mr. King.

Mr. KING. Thank you, Mr. Chairman. Mr. Meyers, I appreciate your testimony, and just a number of subjects I would run across. And want to ask if you have any measure, any sense of what has happened to the migration of capital to or away from the infrastructure investment for renewable fuels development since this ag bill was passed and the blender's credit was cut by 6¢?

Mr. MEYERS. I wouldn't have that specific information, but I would be happy to provide it for the record. Obviously we have had a period of investment in the renewable fuel industry, and priority is in anticipation and after the passage of RFS2. But I would be happy to provide it for the record, or we can also check with the Department of Agriculture.

Mr. KING. I would ask that you provide that information to the Committee and ask you also if you could just simply give us your judgment on what the general direction of that flow of capital might be. And if you would be prepared to answer that now with an internal—just your judgment, your own personal judgment today as you look into the impact on investors and see what has happened, what would you expect?

Mr. MEYERS. I am a lawyer, not an economist so I would probably demure on speculation on that question. Again I apologize if I am not prepared to answer it now, but we will provide a response for the record.

Mr. KING. Thank you. I am willing to speak on the record on what I think is happening. And that is I think capital is migrating away from the infrastructure, development of renewable fuels, particularly corn-based ethanol. And it may well have put the brakes on the future development of the industry coupled with high grain prices.

And I wanted to also make the point, and I am guessing a little bit here, because some of this is on the fly, but I have talked to people that have paid $7.03 cash for corn for feed. We know that the cash market has actually got a little higher than that, and we can talk about futures that are well above that. But, I also saw cash corn prices down well below a dollar under that. And that is going in the right direction for stability in these markets.

And I wanted to raise this caution. I know in your testimony, you say that you are monitoring the aftermath of the Midwest floods. I encourage you strongly to hold out and wait for this August crop report, which will be our first real picture of what we are going to be seeing in the fall. So that RFS standards can be evaluated in light of what we are likely to see come out of the field in the fall rather than the speculation that comes in June and July. August is when you really know for the first time. You have a pretty good measure anyway.

I wanted to also ask you if you are looking at the logistics of cellulosic. One of my concerns is that we have the infrastructure for corn-based ethanol. We know how to harvest corn and transport that, and so all that infrastructure is in place. All we had to do was build a plant and send it, sometimes instead of to the elevator, to the ethanol plant.

The cellulosic is entirely different, and we don't really even know what species we will be raising, what group of crop species we will be raising, let alone how we might have to have new equipment to plant and harvest and transport. And so I just think in terms of cellulosic being anything that looks like a big bale of hay. And I know there is a lot of air in a load of that. It is hard to get much weight in volume, which means our loads can't effectively be hauled much of a great distance. That entire infrastructure that will have to be built, is that considered as well, when you look at the cellulosic future?

Mr. MEYERS. Yes, I think we are looking at issues like that. Obviously the corn infrastructure, as you point out, developed over time and even with the current ethanol plant, most of the feedstock is fairly local, within 30 or 50 miles or so of a production plant. So one might presume the same sort of structure when you are moving a lot of feedstock will apply to cellulosic.

But whatever crops may be used for cellulosic production, whatever the challenges may be, those are issues, some of which will be settled by the marketplace. In our analysis, we try to look as best we can at the fuel distribution system and production, but we are probably constrained by our ability to project exactly how the market will respond to a mandate.

Mr. KING. And if I can just quickly ask you on another subject, if the EPA were to mandate blenders pumps as a means to get past the 10 percent, and you spoke about that blenders law, what would be the estimated capital investment there, and how would one implement such a thing?

Mr. MEYERS. You mean in terms of the retail distribution of the——

Mr. KING. Yes.

Mr. MEYERS. I am not sure, outside of—I will check, and I am always hesitant to just speculate. But I think between an E10, an E15 and E20, I don't think—there could be some fitting issues, but I don't think it is a major transition in terms of the retail distribution.

Mr. KING. If I could, perhaps, ask that question more specifically in at least and perhaps several of the states, there exist blenders pumps where you can dial the percentage of blend.

Mr. MEYERS. The—I am sorry. Excuse me.

Mr. KING. Okay.

Mr. MEYERS. Well, the issue for us would be in terms of—well, there are several issues, potential issues, including misfueling vehicles that cannot accommodate the blend above a certain level. Right now, essentially in the marketplace, E10 is a legal fuel, and E85 is a legal fuel. Beyond that, there are issues with intermediate blends that we are looking at specifically in the State of Minnesota. And Minnesota is doing some studies, and DOE is assisting in that effort.

But we have to think not only of cause, we have to think of secondary equipment. We have to think of off-road equipment that utilizes the fuel, and a host of issues in terms of intermediate blends that need to be looked at from the engine components and the fuel system and make sure safety is preserved as well as the performance of the vehicle.

So if you are talking about dial a blend effects—your vehicle is able to utilize that—but other equipment in the marketplace right now, we have not made that determination.

Mr. KING. Thank you, Mr. Meyers. Thank you, Mr. Chairman. I yield back.

The CHAIRMAN. Before the chair goes to Mr. Salazar, I see the Ranking Member has arrived and would recognize the Ranking Member for any statement he may have.

STATEMENT OF HON. BOB GOODLATTE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF VIRGINIA

Mr. GOODLATTE. Thank you, Mr. Chairman. I want to thank you for holding today's hearing to review the implementation of the Renewable Fuel Standard.

The Energy Independence and Security Act of 2007 dramatically increased the RFS to 36 billion by 2022. The expanded RFS also creates an unrealistic mandate for conventional corn ethanol by prohibiting the use of biomass from new crop acres. This restriction will make it difficult, if not impossible, for producers to meet the food and fiber demands of our consumers while also meeting the mandates set in the RFS.

We also face a major problem in the transition from grain-based fuels to cellulosic biofuels if EISA is interpreted narrowly to restrict the cellulosic feedstocks from forests and agriculture lands that can be used to meet the RFS.

Virginia has been in the business of agriculture for over 400 years. Much of the uncropped land in the 6th District has the potential to grow switchgrass and help meet the demands of cellulosic ethanol if and when it becomes commercially available. However, the unnecessary land restrictions in the RFS will limit potential biomass to be used to meet the mandate.

The Act also discourages the production of cellulosic fuels from forests, one of the largest potential sources of cellulosic feedstock. Use of forest biomass for biofuels creates markets for byproducts of forest improvement projects. This can help solve our nation's energy, forest health, and wildfire problems and also help forest owners stay on the land.

Even with the advancement of cellulosic biofuels, the expansion of the RFS would still require 15 billion gallons of renewable fuel

to come from the only current commercially available option, grain ethanol. We have seen the impacts of using food for fuel now, even before the mandate is reached. This year, over 30 percent of the expected U.S. corn crop will be used for ethanol production. That amount is expected to rise significantly over the next few years.

Because livestock feed is used to meet our renewable fuel initiatives, the livestock sector is facing significantly higher feed costs. Corn and soybeans' most valuable market has always been, and will continue to be, the livestock producers. We must ensure that there are not unintended economic distortions to either grain or livestock producers as a result of these sectors prospering from other markets.

Today, we expect the Environmental Protection Agency to rule—actually I don't think we do now. They have announced a delay on the RFS waiver request sent by Governor Rick Perry of Texas. However, that ruling has been delayed until mid-August to give the EPA time to gather more information. While I understand there are many factors that play into the rising price of corn, a temporary reduction in the government-mandated RFS is the only factor in our control that would give immediate relief to livestock producers and consumers.

I am interested to hear today's testimony on how the EPA will implement the expanded RFS. I am supportive of the development of renewable fuels, but more importantly, I am in favor of developing a policy that is technology neutral and allows the market to develop new sources of renewable energy.

I hope today's hearing will alleviate some of my concerns regarding the implementation of the RFS. I appreciate the efforts of the Chairman to hold this hearing, but equally importantly, the Chairman of the full Committee to attempt to address this issue. And I hope that legislation, which I was pleased to cosponsor, offered by Congresswoman Herseth Sandlin, The Renewable Biomass Facilitation Act of 2008, which would replace the definition of *renewable biomass* in the Clean Air Act and eliminate the crop and forestry restrictions that are currently in the RFS. There are things that we can do if we work together, and I hope that we have the opportunity to do that. Thank you, Mr. Chairman.

The CHAIRMAN. The chair thanks the Ranking Member. The gentleman from Colorado has yielded his position to the gentlewoman from South Dakota. The gentlewoman is recognized.

Ms. HERSETH SANDLIN. Thank you, Mr. Chairman. I thank the gentleman from Colorado. Mr. Meyers, thank you for being here. I would like to follow up on some of the questions that the Chairman of the Subcommittee and of the full Committee posed as well as the issue that is addressed in legislation I have introduced that the Ranking Member just mentioned.

And that relates to this very unfortunate provision, in my opinion, that was added late in the process of the energy bill that we passed in December, which would essentially, in defining *renewable biomass*, eliminate materials harvested on national forestland as well as what the Subcommittee Chairman mentioned in terms of the definitions for private sources of biomass that I think are overly restricted.

I am going to refer to some of the testimony, the written testimony from our next panel, and just ask you to respond to a point on the matter of this definition. Ms. Wong's written testimony notes that under EESI's interpretation of the definition of *renewable biomass* in the 2007 Energy Bill, materials harvested on national forestland would not count toward the RFS unless taken from "the immediate vicinity" of building or other infrastructure in danger of wildfire. She believes this definition is "exceptionally vague and is altogether unclear how it would be interpreted."

Similarly, Mr. Blazer's written testimony is that the current definition of *renewable biomass* "creates a bureaucratic nightmare that makes any use of woody biomass cost prohibitive." Do you agree that this definition poses serious difficulties in interpretation and implementation?

Mr. MEYERS. Well, I think any new legislative definition provides a challenge for the EPA. We have to, under principles of interpretation, look at the statute, and we have to, of course, look at the legislative history and the context in which it was passed.

Ms. HERSETH SANDLIN. Well, in your experience——

Mr. MEYERS. Yes.

Ms. HERSETH SANDLIN.—does this particular definition pose more serious challenges in implementation and interpretation?

Mr. MEYERS. Well, we have a number of terms in the Clean Air Act, which I am very familiar with, which are broad terms. This is another instance where we have some broad language which we are going to have to interpret. You know, we, as an implementing agency, really don't have a choice but to do our best to try to work with the definition we have.

Ms. HERSETH SANDLIN. Do you anticipate problems with analyzing the legislative history, given that this language was never vetted through this Committee or any other Committee that I am aware of, before that legislation, that provision was introduced into the legislation?

Mr. MEYERS. Well, if there is no legislative history, that is—there is no legislative history.

Ms. HERSETH SANDLIN. On another topic, it is Mr. Cassman's understanding—he is also testifying on the next panel—that EPA is relying on the GREET model, the Greenhouse Gases Regulated Emissions and Energies in Transportation model from the Argonne National Laboratory for estimating direct effects of greenhouse gas emissions of corn ethanol systems. Is that correct?

Mr. MEYERS. Yes.

Ms. HERSETH SANDLIN. And Mr. Cassman's written testimony states that the BESS, the Biofuel Energy Systems Simulator model, for measuring greenhouse gas emissions of corn ethanol systems is distinguished from the GREET model in that the BESS model "uses more data for crop reduction, biorefinery, energy efficiency, and coproduct use." Do you agree?

Mr. MEYERS. I will have to get back—I am not as familiar with the BESS model.

Ms. HERSETH SANDLIN. Well, Mr. Cassman also states that the use of the GREET model means corn ethanol will be unable to satisfy the 2007 Energy Bill's requirement of 20 percent greenhouse gas emissions reductions. Has EPA reached a decision on whether

or not then it will consider using the BESS model? Perhaps your earlier statement indicates that you haven't, but——

Mr. MEYERS. No, we haven't. Obviously we are at pre-proposal stage. So that will be part of what we put forth for public comment. We have had the GREET model for a number of years and worked with DOE to improve that model. The issue is the legislative definition. With regard to the 20 percent, there is a provision that allows for that to be lowered on certain findings.

Ms. HERSETH SANDLIN. Okay. Well, I would appreciate if you could get back to us with further information on your views on the BESS model——

Mr. MEYERS. Sure. Be glad to do that.

Ms. HERSETH SANDLIN.—compared to the GREET model, as Mr. Cassman goes into that analysis. I know you may or may not have had a chance to review some of their written testimony ahead of time. I did want to bring that to your attention because it is very important to use the model that uses the most up-to-date information, particularly given the technological advancements in many corn ethanol plants, they are improving efficiency dramatically.

Thank you, Mr. Chairman.

The CHAIRMAN. The chair thanks the gentlewoman and recognizes the gentleman from Ohio, Mr. Space.

Mr. SPACE. Thank you, Mr. Chairman. I was hoping you might help me understand something, Mr. Meyers. The Energy Independence and Security Act—I agree with my colleague from South Dakota—contains some unfortunate definitional elements.

One of the provisions provides that the EISA restricts use of lands on which to produce renewable biomass to lands that have been cleared or cultivated prior to December 19, 2007. What is the rationale for, as you understand it, for imposing that restriction or limitation?

Mr. MEYERS. Well, as referenced earlier, there is probably a lack of legislative history with regard to provisions, so I am hesitant to speculate. But I think that the issues with land use have involved essentially clearing of land not previously used and harvesting of stored carbon, and that there have been some studies to indicate that that has a fairly sizable negative GHG effect.

Mr. SPACE. Thank you.

The CHAIRMAN. Any follow-up questions for Mr. Meyers? Well, I would just ask the Department then if they had any comments about the implementation process? Are they satisfied or have any suggestions? If anyone from the Department would—Mr. Meyers, I said, that the cooperation between EPA and the Department, I am sure there is substantial cooperation. I am just curious if the department had any comment they would like to make.

Mr. HAGY. Yes, my name is Bill Hagy. I am the Deputy Administrator for Business Programs in Rural Development.

The CHAIRMAN. Can you state your name again, sir.

Mr. HAGY. Yes, Bill Hagy. I am the Deputy Administrator for Business Programs in Rural Development. We have started some dialogue with the fellow departments with regards to implementation of the farm bill. I think you are aware that there is a biomass board that meets. It is made up of all the Federal departments and Federal agencies, and there has been some dialogue within that

board also on some of these issues. So they are beginning to be addressed in comparing the farm bill to EISA and how the two bills can work together.

The CHAIRMAN. So you are very much aware of the problem that the Chairman of the full Committee and the Ranking Member addressed in their comments about how we are very concerned that there is going to be difficulty in having equity and participation, right?

Mr. MEYERS. Those concerns have been raised, and they are being considered within the Department and working with our fellow departments.

The CHAIRMAN. Okay, well we need your help on this. So please stay in touch.

Mr. MEYERS. Thank you.

The CHAIRMAN. Mr. Meyers, thank you very much for your testimony and your answering of the questions.

Mr. MEYERS. Thank you.

The CHAIRMAN. We now call on panel two, and we would like to invite to the table Ms. Jetta Wong, Senior Policy Associate, Environmental and Energy Study Institute from Washington, D.C. Mr. Arthur "Butch" Blazer, Forestry Division, New Mexico, Energy, Minerals, and Natural Resources Department from Santa Fe, New Mexico. Mr. John Burke, Partner, McGuire Woods from Richmond, Virginia. Mr. Duane Grant, farmer from Rupert, Idaho. Dr. Kenneth Cassman, Director, Nebraska Center for Energy Science and Research in Lincoln, Nebraska. And Dr. Mark McDill, Associate Professor of Forest Management, Pennsylvania State University, University Park, Pennsylvania. Ms. Wong, you may begin when you are ready.

STATEMENT OF JETTA L. WONG, SENIOR POLICY ASSOCIATE, SUSTAINABLE BIOMASS AND ENERGY PROGRAM, ENVIRONMENTAL AND ENERGY STUDY INSTITUTE, WASHINGTON, D.C.

Ms. WONG. Good morning, Mr. Chairman and Members of the Subcommittee. Let me begin by thanking you for the opportunity to speak here today and represent my organization, the Environmental and Energy Study Institute, or EESI.

We believe that global climate change is the single most serious challenge facing the world today. At the same time, the price of gasoline has skyrocketed due to a variety of factors, including fundamental restrictions in supply. Congress has begun to address these challenges in a number of pieces of legislation, including the Energy Independence and Security Act of 2007 and the Food, Conservation, and Energy Act of 2008. And we applaud this Committee's leadership in this area.

EISA substantially increases the Renewable Fuel Standard, calling for the production of 36 billion gallons of renewable fuel by 2022 with specific targets for greenhouse gas reductions. Within the 36 billion gallon mandate, 21 billion gallons must come from advanced biofuels, which means renewable fuel other than corn-based ethanol. Additionally, there is a carve-out for cellulosic biofuels, which are derived from renewable biomass. Unfortunately the definition of *renewable biomass* included in the law deems sev-

eral feedstocks ineligible, including thinning materials and woody residues from Federal forests, some woody feedstocks from private forests, and a wide array of feedstocks from municipal solid wastes.

As we read this definition, all materials harvested on national forests and public land would be excluded with the exception of materials removed from the immediate vicinity of buildings and infrastructure at risk of wildfire.

This provision is exceptionally vague and is altogether unclear how it would be interpreted. It is unlikely that any reasonable interpretation would encompass more than a nominal portion of the acres that could benefit from hazardous fuel reduction. And none of the biomass that could be removed from any other form of restoration or stewardship activity.

In addition to the public land exclusion, the *renewable biomass* definition has the potential to exclude the majority of the biomass that could be made available from private lands. The definition allows for the usage of planted trees and tree residue from actively managed tree plantation and non-Federal land cleared at any time prior to enactment and slash and pre-commercial thinning that are from non-Federal forestlands. This language limits the use of commercial size trees to those coming from intensively managed tree plantation and only logging residue and pre-commercial thinnings from naturally regenerated forests.

This provision draws an entirely arbitrary distinction between trees that are planted and trees that grow from seeds. This is a mistaken notion that forests composed of the latter must somehow be more wild, pristine, or valuable.

EESI believes that this definition needs to be reexamined for several reasons. First, renewable fuel facilities provide a market for low value materials produced through forest management practices. Forests have approximately ⅓ of the nation's land area, and much of that acreage is under some kind of management activity.

The DOE USDA billion ton study found over 100 tons of logging residue or thinning materials generated as a result of hazardous fuel reduction treatments from private and Federal lands. This could produce nearly 66 percent of the 16 billion gallons of cellulosic fuels mandated by the RFS. And right now, gasoline prices would be 35¢ per gallon higher if it were not for the renewable fuels produced today.

Furthermore, abundant sources of woody biomass in the West, which is mostly public land, can increase the distribution of liquid transportation fuels across the country. This will help to meet the large fuel markets in the West, while further securing our energy supply. Additionally, some residues from municipal solid waste are excluded from the *renewable biomass* definition, yet there are low value feedstock that several companies already are researching. Production of these fuels from these materials reduces the pressure to develop feedstocks on sensitive land.

Additionally confusing or varying definitions included in public law create risk, limit intervention, and ultimately reduce the use of feedstocks currently considered a problem.

A variety of stakeholders overwhelming support using the feedstocks that are eligible for the Renewable Fuel Standard. In addition to the four letters that I have already submitted for the record,

I would like to submit a fifth letter from four prominent academics. The signatories of this letter have a combined 130 plus years of experience dealing with forestry issues.

The letter states, "the definition of 'renewable biomass' that was included in the final version law, however, does not address sustainability, best management practices, or good stewardship of natural resources. What it does do is exclude a wide selection of feedstocks based on ownership and broad classification of landscapes."In summary, cellulosic biofuels can be produced from a highly diverse array of feedstocks, allowing every region of the country to be a potential producer of fuel. And we should not let these arbitrary distinctions restrict their use or our country's innovation to turn them into a renewable fuel.

I would like to thank the Subcommittee once again for the opportunity to speak before you today. Let me also extend my gratitude for your part in creating and passing this important Renewable Fuel Standard and recognizing its role in addressing protection and national security. Thank you.

[The prepared statement of Ms. Wong follows:]

PREPARED STATEMENT OF JETTA L. WONG, SENIOR POLICY ASSOCIATE, SUSTAINABLE BIOMASS AND ENERGY PROGRAM, ENVIRONMENTAL AND ENERGY STUDY INSTITUTE, WASHINGTON, D.C.

Good morning, Mr. Chairman and Members of the Subcommittee, let me begin by thanking you for the opportunity to speak here today and represent my organization, the Environmental and Energy Study Institute. EESI is an independent nonprofit organization founded by a bipartisan Congressional caucus in 1984 to provide policymakers with reliable information on energy and environmental issues, to help develop consensus among a broad base of constituencies, and to work for innovative policy solutions. Our Board is interdisciplinary and is drawn from academia as well as the public and private sectors, including Dr. Rosina Bierbaum, Dean, School of Natural Resources and the Environment, University of Michigan, and Ambassador Richard Benedick, who was a lead U.S. negotiator of the Montreal Protocol. Our Board is chaired by Richard L. Ottinger of New York, a former chair of the House Energy & Power Subcommittee and the Dean Emeritus of Pace University Law School.

Summary

While skepticism about the reality of climate change has waned in light of overwhelming evidence, agreement on the policies, preferred technologies, and time frame for taking action are still very much in debate, and no clear consensus has yet emerged. Climate change and energy consumption have climbed to the top of the national policy agenda. Congress has addressed climate change in a number of pieces of energy legislation, including the *Energy Independence and Security Act of 2007* (P.L. 110–140) and the *Food, Conservation, and Energy Act of 2008* (P.L. 110–234), and we applaud this Committee's leadership in this area. In addition, "green" technology has become an important economic driver. Multinational corporations and many others in the private sector, including many energy companies, have emerged as interested players in renewable energy and energy efficiency (RE/EE) technologies, seen as a way to combat climate change and improve their bottom lines. Biomass-to-energy technologies such as biofuels have been recognized by the Federal Government and many state governments, corporations and investors as a renewable energy technology that is a critical component of a climate change mitigation strategy.

At the same time the price of fossil fuels has skyrocketed due to a variety of factors, including fundamental restrictions in supply as development worldwide continues to fuel demand. Our nation's dependence on imported foreign oil poses a significant economic, energy, and national security challenge. In 2007, the transportation sector was 96 percent dependent on petroleum and consumed 70 percent of

total U.S. petroleum demand,[1] of which roughly 60 percent was imported.[2] Such a reliance on foreign oil increases the vulnerability of the United States to higher oil prices and oil price shocks due to events such as natural disasters, terrorist attacks, and wars; undermines our ability to conduct foreign policy; and places us at the will of a small group of oil producing states that can use their market power to influence world oil prices.[3] There are many "hidden costs" or externalities associated with the consumption of imported oil including direct and indirect costs, oil supply disruption impacts, and military expenditures.[4] According to the Government Accountability Office, the United States has subsidized the oil industry by more than $130 billion in the past 32 years.[5]

On December 19, 2007 the President and Congress took a huge step forward in trying to mitigate climate change and reduce our country's reliance on fossil fuels by enacting the Energy Independence and Security Act (EISA, P.L. 110–140). EISA substantially increases the Renewable Fuel Standard (RFS), calling for the production by 2022 of 36 billion gallons of renewable fuel with specific targets for greenhouse gas reductions. Within the 36 billion gallon mandate, 21 billion gallons must come from advanced biofuels, which means renewable fuel other than ethanol derived from corn starch. Additionally, there is a carve-out within the advanced fuels mandate that 16 billion gallons of cellulosic biofuel be derived from 'renewable biomass.' This is an aggressive and ambitious RFS. It is laudable, but it stirs up a lot of difficult issues regarding the sustainability of biofuels. One of the biggest factors in determining if a biofuel is sustainable is the choice of feedstocks used to produce the renewable fuel. Unfortunately, the definition of 'renewable biomass' included in the law deems several feedstocks ineligible, including thinning materials and woody residues from Federal forests, some woody feedstocks from private forests, and a wide array of feedstocks from municipal solid waste.

Key Points:

- Renewable fuels are important to our climate and energy security strategy. They are reducing our dependence on foreign oil, reducing the cost of gasoline at the pump, and if produced sustainably, reducing greenhouse gas emissions.
- Renewable fuel facilities provide a market for low-value material produced through forest management practices.
- Abundant sources of woody biomass in the West can increase the distribution of liquid transportation fuels across the country. This will help to meet the large fuel markets of the West while further securing our energy supply.
- Mill residue and other woody materials create complications (in terms of collection) and should be carefully considered during implementation.
- Municipal solid waste is a low-value feedstock that several companies are investigating. Confusing or varying definitions included in public law create risk, limit innovation, and ultimately reduce the use of a feedstock currently considered a problem.
- Production of renewable fuels from low-value materials, such as woody biomass and municipal solid waste, reduces the pressure to develop feedstocks on sensitive land.
- A variety of stakeholders overwhelmingly support a broadening of feedstocks that could be eligible for the RFS. Specifically, low-value woody biomass sustainably harvested from both Federal and private lands should be included.

Cellulosic biofuels can be produced from a highly diverse array of feedstocks, allowing every region of the country to be a potential producer of this fuel. (Cellulose is found in all plant matter.) As a result, support for cellulosic biofuels has brought together a broad array of constituents including environmentalists, farmers, national security experts, industry, and religious leaders. Unquestionably, the production of renewable fuels needs to be done in a way that sequesters carbon and enhances natural resources, including soils, water supply and native habitats. Produc-

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[1] U.S. Energy Information Administration. *Annual Energy Review*. "U.S. Primary Energy Consumption by Source and Sector, 2007." June 23, 2008.

[2] U.S. Energy Information Administration. *Monthly Energy Review*. "Table 3.3a Petroleum Trade Overview." June 25, 2008. 43.

[3] Greene, David L., and Sanjana Ahmad. "Costs of U.S. Oil Dependence: 2005 Update." Oak Ridge National Laboratory. Paper prepared for U.S. Department of Energy. February 2005. xi.

[4] Copulos, Milton, President of National Resource Defense Council Foundation. "The Hidden Cost of Oil." Testimony before the U.S. Senate Foreign Relations Committee. March 30, 2006. 1, 3.

[5] U.S. Government Accountability Office. "Petroleum and Ethanol Fuels: Tax Incentives and Related GAO Work." GAO/RCED–00–301R. September 25, 2000.

tion of renewable feedstocks should not be deemed to be in competition with the goals of sustainable agriculture or forestry. In fact, there are opportunities for renewable fuel and energy production to aid conservation efforts and environmental sustainability beyond those associated conventional agriculture, forestry or fossil fuel production and consumption.

Renewable Fuels: Part of Our Climate and Energy Security Strategy

EESI believes that the rapidly escalating pace of global climate change is the single most serious challenge facing the world today. According to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC),[6] the increase in concentration of greenhouse gases since the pre-industrial era is due primarily to human activities, especially the widespread combustion of fossil fuels. The report specifically concludes that the "*global net effect of human activities since 1750 has been one of warming*". Evidence of existing climate change impacts is staggering, and alarming new ramifications of global warming are reported weekly. Among many such reports, scientists from the National Geographic Institute reported on June 20, 2008 that the Arctic Ocean may be ice-free this summer for the first time in recorded history.[7] Energy efficiency and renewable energy, specifically bioenergy, are important energy sources that can help mitigate phenomena such as this.

Renewable fuels are one of many important tools in the effort to reduce our national greenhouse gas emissions from the transportation sector. According to the U.S. Environmental Protection Agency's inventory of greenhouse gas emissions,[8] the U.S. emitted a total of 7,260.4 Tg CO_2-eq/yr in 2005, which was an increase of 16.3 percent compared to 1990. Twenty-three percent of these emissions (1669.9 Tg $COCO_2$-eq/yr) were from petroleum-based transportation fuels. Renewable fuels are especially attractive as a low- or no-carbon alternative to petroleum-based fuels such as gasoline and diesel. The technology is sustainable, rapid to implement, and available across the entire United States.

The United States has the resources necessary to provide for our energy needs, and renewable fuels can and will play a vital role as part of a larger strategy to diversify our energy supplies. A June 2008 report released by Merrill Lynch concluded that biofuels are the single largest contributor to global oil supply growth in light of the inability of non-OPEC crude oil supply to expand. "*According to the International Energy Agency, 'biofuels have become a substantial part of faltering non-OPEC supply growth, contributing around 50 percent of incremental supply in the 2008–2013 period.'*"[9] The use of domestically produced renewable fuels extends fuel supply by displacing the amount of foreign crude oil the United States needs to import.

According to the U.S. Energy Information Administration's 2008 International Energy Outlook, global energy consumption of liquids and other petroleum will grow from 83.6 million barrels of oil per day in 2005 to 112.5 million barrels of oil per day by 2030. The transportation sector will account for 74 percent of that increased demand, mostly from non-OECD nations. Additionally, world oil prices are expected to be in the range of $113 to $186 per barrel in nominal terms in 2030.[10] Concern about a potential shortfall of supplies and high prices is intensified by the possibility of supply disruptions due to the instability of four of the top six sources of U.S. oil imports from the countries of Saudi Arabia, Venezuela, Nigeria, and Iraq.[11] Furthermore, ⅔ of the world's known oil reserves lie in the volatile Middle East,[12]

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[6] IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group 1 to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[7] Mehta, Aolok. "North Pole May Be Ice-Free for First Time This Summer" June 20 2008 *National Geography News.*

[8] U.S. Environmental Protection Agency. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2005.* 15 April 2007.

[9] Renewable Fuels Association, Canadian Renewable Fuels Association, European Bioethanol Fuel Association, and UNICA. *Financial Times.* "OPEC Rakes in Billions, but Blames Biofuels . . . Confused?" July 16, 2008.

[10] U.S. Energy Information Administration. "International Energy Outlook 2008." June 2008, 2, 5.

[11] Copulos 2006. 2–3.

[12] Renewable Fuels Association. "Ethanol Facts: Energy Security."

while the United States contains less than three percent of the world's oil reserves but consumes ¼ of the world's oil.[13]

Forests a Valuable Resource

Forests cover approximately ⅓ of the nation's land area and much of that acreage is under some kind of forest management directive, whether that is timber management, habitat improvements, hazardous fuel reduction, or one of the many forms of stand improvement thinning activities. A number of NGOs support the use of sustainable woody biomass to produce renewable fuels. The Oregon Environmental Council said this in its 2005 *Fueling Oregon with Sustainable Biofuels* report,

> *". . . if renewable fuels are produced sustainably, they can generate substantial reductions in greenhouse gas emissions and improvements in air and water quality . . . Thinning and removal of biomass from these forests* [at risk from fire] *would improve forest and provide a substantial supply of biomass for energy production. While there are clear environmental benefits to greater utilization of forest biomass, there are also real sustainability concerns."*[14]

Unfortunately, the majority of forest-derived feedstocks are rendered ineligible for the RFS because of the narrow definition of *renewable biomass* included in the law. As we read this definition, all materials harvested on national forests and public lands would be excluded (P.L. 110–140, Title II, Sec. 201[I]), with the exception of materials removed from the "*immediate vicinity*" of buildings and infrastructure at risk from wildfire (P.L. 110–140, Title II, Sec. 201[I][v]). This provision is exceptionally vague and it is altogether unclear how it will be interpreted. It is unlikely, however, that any reasonable interpretation would encompass more than a nominal portion of the acres that could benefit from hazardous fuels reduction and none of the biomass that could be removed from any other form of restoration or stewardship activity, including habitat improvements, recreation management, or timber stand improvement.

In addition to the public land exclusion, the 'renewable biomass' definition has the potential to exclude the majority of the biomass that could be made available from private lands. The definition allows for the usage of "*planted trees and tree residue from actively managed tree plantations on non-Federal land cleared at any time prior to enactment . . .*" and "*slash and pre-commercial thinning that are from non-Federal forestlands . . .*" (P.L. 110–140, Title II, Sec. 201[I][ii], [iv]) This language limits the use of commercial-size trees to those coming from intensively managed tree plantations and allows only logging residues and pre-commercial thinning from naturally-regenerated forests. This provision draws an entirely arbitrary distinction between trees that are planted and trees that grew from seed in the mistaken notion that a forest composed of the latter must somehow be more wild, pristine, or valuable. This is not true. There are ample examples of well-managed, biodiverse plantations and plenty of poorly treated, cut-over and eroded "natural" forests. The reverse is also true. The entire package of management practices, of which a regeneration system is one component, must be used to determine what is and is not sustainable on a given landscape.

Renewable Fuels Market: Important for Materials from Stand Improvement Activities

Stand improvement activities, specifically thinning of small-diameter trees, can be a valuable tool for managing forests for many other values and objectives. Thinning can result in improved tree vigor, increased drought tolerance, and increased growth by decreasing the stand density and reducing competition between trees for sunlight, water, and nutrients. Because vigorous fast-growing trees are generally more proof against pests, thinning can be a successful means to reduce the extent and lethality of insect infestations in many forest systems. In addition, harvesting of small-diameter trees can be an important component of habitat management for wildlife species that require early successional habitat or low stand density. Finally, forest thinning and other silvicultural activities can have positive effects on watershed functioning, and specifically water yield,[15] one of the most essential ecosystem services from Federal forests in much of the western United States.

What trees should be removed during a restoration treatment is a question that differs dramatically depending on the forest type, location, stand conditions, and

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[13] Cooper, Mark. "No Time to Waste: America's Energy Situation is Dangerous but Congress can adopt new policies to secure our future." Consumer Federation of America. October 2007. 2.

[14] Gilman, Dan. *Fueling Oregon with Sustainable Biofuels.* Oregon Environmental Council. October 2005.

[15] Stednick, J.D. 1996. *Monitoring the effects of timber harvest on annual water yield.* JOURNAL OF HYDROLOGY 176: 79–95.

restoration objectives. **Forest restoration in forests where stand conditions (whether fire regimes, habitat elements, or ecosystem functioning) have radically departed from the past often requires vegetation management across a wide spectrum of tree species, ages, and sizes—not only the removal of "*slash and pre-commercial thinnings*"**. The differences between forests require management to be determined on the ground, but prescribed in detail at the national level. This is the reason that detailed, site-specific management plans are mandated for all public forests. In a study by the Pinchot Institute for Conservation,[16] management at five national forests was evaluated against the standards adopted by the Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI), the two largest forest certification programs in the United States. The study found that management practices on these forests met or exceeded the majority of the substantive sustainability criteria in both certification schemes. One area where the Forest Service was not in conformance was in addressing management activities:

> *"Consistent delays or backlogs in meeting treatment objectives led [FSC and SFI] auditors to find most case study forests falling short of their stated economic, ecological, and social goals. FSC and SFI auditors suggested the backlog in harvest treatments and persistent lack of funding has exposed forests to increased risk of disease, insect outbreaks, stand-replacing wildfires, and in some cases, being unable to provide key habitat features for certain endangered species."*

Unfortunately, as we described earlier, this material, like all material from Federal land, is excluded from the definition. Although the Forest Service is not currently looking into certification, these independent evaluations demonstrate that the level of stewardship on public forests is comparable to private forests that have achieved FSC and SFI certification. For more information on stand improvements please see the two attached factsheets on public and private forests.

Pre-commercial thinning, habitat restoration, hazardous fuels reduction, and other stand improvement activities are expensive operations, however, and feasibility is often limited by the lack of widespread markets for small-diameter trees and woody biomass. Transportation costs and low market value for this material limit its removal, so the majority of materials are chipped in the field or burned in open piles. These open fires are still generating renewable energy, but it is energy that is being wasted instead of being put to productive work in vehicle engines. Without a financial outlet, forest and woodlot owners (private or public) can rarely afford to invest in thinning or other stand improvement activities.

Moreover, we frequently hear the argument that public costs would be less (on a per acre basis) if funds were allocated for proactive fuels reduction as opposed to reactive fire fighting. In the long run this is probably true, but the transition in strategies will not be an immediate one and catastrophic fires will continue to be a major element of the landscape in the near future. After the expenditures associated with fighting the fires that are burning today, not much is left to begin restoring the vast acreage at risk of burning tomorrow. It is going to be a slow process. In the meanwhile we need to find a commercial outlet for thinning materials if we hope to deal with an issue of this scale and size. Lignol Energy Corporation, a Canadian based company, is planning to construct a demonstration scale facility in Commerce City, Colorado, which may be just the commercial outlet needed. It is expected that this facility will utilize woody biomass as one of its primary feedstocks to produce about 2.5 million gallons of renewable fuel annually. In June of 2007 Ross MacLachlan, President and CEO of Lignol, said this in reference to trial tests to convert Mountain Pine Beetle damaged softwood and other wood species to cellulosic ethanol,

> *"These results in converting Mountain Pine Beetle damaged softwoods to cellulosic ethanol confirm our view that this abundant feedstock currently found in British Columbia, Alberta and the Pacific Northwest of the United States represents a significant untapped potential for transportation fuels."*[17]

Thus, national efforts to promote production and use of cellulosic biofuels, such as the RFS, have tremendous potential to act as an important incentive for im-

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[16] Sample, A.V., W. Price, J.S. Donnay, and C. Mater. October 22, 2007. National Forest Certification Study: An evaluation of the applicability of Forest Stewardship Council (FSC) and Sustainable Forest Initiative (SFI) standards on five national forests. Pinchot Institute for Conservation. p. 83.

[17] Lignol Energy Corporation. Lignol Receives Additional Funding from Ethanol BC and Announces Successful Trial Results for Mountain Pine Beetle Damaged Softwood and Other Wood Species. *http://www.lignol.ca/news.html.* (accessed July 21, 2008).

proved management practices and better stewardship of forest resources . . . if only the material qualified.

Forests Biomass: Readily Available and Abundant

In order to ensure that feedstock production is pursued sustainably, a national biomass assessment needs to be funded and carried out. The "billion ton study",[18] a joint report issued by the U.S. Department of Energy (DOE) and USDA, was done to determine if "a 30 percent replacement of the current U.S. petroleum consumption with biofuels by 2030" could be accomplished. Although this is a controversial document and many of its conclusions are disputed, it nonetheless provides the most rigorous national estimate to date. The "billion ton study" found that approximately 2.9295 billion tons of woody biomass could be obtained from public lands in the form of logging residue or thinning materials generated as a result of hazardous fuel reduction treatments annually. Most of this material is currently inaccessible due to topography, lack of infrastructure, or cost of removal. However, an estimated 21.5 million tons would be available using existing roads and infrastructure. The same study estimates that privately-owned forests have the potential to generate 5.5531 billion dry of woody biomass, of which 78.9 million tons is currently accessible. **In total, 100.4 million tons of woody biomass is currently available from private and Federal lands.**

Converting this woody biomass to cellulosic ethanol could produce between 5.5 and 6.5 billion gallons of cellulosic ethanol using current technologies.[19] Ethanol is not the only biofuel option, however, nor is it necessarily the most efficient one. In a recent press release,[20] Syntec Biofuel announced yields of 105 gallons per ton for a number of higher alcohols, such as methanol, n-butanol, and n-propanol. When yields of this scale become commercially feasible, our **public and private forests could produce almost 10.5 billion gallons of renewable fuels**[21]**—nearly 66 percent of the 16 billion gallons of cellulosic fuels** mandated by the RFS. *These fuel estimates are not meant to be conclusive,* but to illustrate that the potential fuel yield from Federal forests is significant and depends strongly on what assumptions are made about resource availability, technological advances, and conversion efficiency. Unfortunately, **almost none of this material falls under the current definition of *renewable biomass.*** Federal forests are excluded in totality and only a minority of private forests can be classified as "*actively managed tree plantations*".

Additionally, Federal forests are not evenly distributed across the nation. In total, they encompass about 43 percent of the national forest resource or approximately 323 million acres.[22] The Western Governors' Association report identifies 23 million acres in 12 states that are at high risk from wildfire. Thinning materials from this acreage could provide up to 318 million tons of biomass,[23] of which 7.2—14.5 million tons annually is immediately accessible and available for fuel production. This number only includes thinning for fuel reduction, which is one source of biomass feedstock among many others already mentioned. Using the Syntec technology this could yield 750 million—1.5 billion gallons.[24] These are some of the regions that are most threatened by catastrophic wildfire and are most in need of hazardous fuels reduction treatments. In counties and communities entirely surrounded by Federal feedstocks, the entire local supply of woody biomass may be off limits. This could have drastic effects where it is possible to produce renewable fuels, favoring eastern states over western ones. When energy security is considered this imbalance in eligible feedstocks becomes even more illogical. During Hurricane Katrina in 2005, 25

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[18] Oak Ridge National Laboratory (DOE) and USDA. DOE GO–102995–2135, *Biomass as Feedstock for a Bioenergy and Bioproducts Industry: Feasibility of a Billion-Ton Annual Supply.* April 2005.

[19] Oak Ridge National Laboratory (DOE) and USDA. DOE GO–102995–2135, *Biomass as Feedstock for a Bioenergy and Bioproducts Industry: Feasibility of a Billion-Ton Annual Supply.* April 2005. Tables A.1–A.7.

Zerbe, John I. *Liquid fuels from wood—ethanol, methanol, diesel.* WORLD RESOURCE REVIEW 3(4):406–414.

100.4 million tons * 55 gpt (dilute acid hydrolysis) = 5522 million gallons.

100.4 million tons * an average of 65 gpt (pretreatment + enzymes) = 6526 million gallons.

[20] Syntec Biofuels "Syntec Biofuel Achieves Yield of 105 Gallons per Ton of Biomass" 8 February 2008.

[21] 100.4 million tons * 105 gpt = 10542 million gallons.

[22] Mila Alvarez. "The State of America's Forests." *Society of American Foresters:* 2007.

[23] Biomass Task Force Report, *Clean and Diversified Energy Initiative,* WGA, January 2006, p. 37.

[24] 7.2 and 14.5 million tons * 105 gpt = 756–1,522.5 million gallons.

percent of the country's oil refining capacity was off line initially. Since then the merits of distributed power as well as fuel production have been discussed as a national security issue. In 2006, 1.4175 billion barrels of petroleum were consumed in the 12 states that were included in the Western Governors' Association thinning assessment. If the 750 million—1.5 billion gallons are used within those states, 18–39 percent of the demand could be supplied.[25]

Mill Residue and Other Woody Materials: Implications of Exclusions

The restrictive nature of the current definition could also exclude, in practice, woody biomass from secondary or mixed sources. In many locations, residues from sawmills and pulp operations source materials from a mixture of Federal, private, plantation, and natural 'forests'. Mill residues (chips, sawdust, bark, etc.) could represent some of the most available, convenient, and economically attractive sources of woody biomass, but this material may not be eligible for the RFS if separating residue streams proves difficult or prohibitively expensive. This problem would also exist in integrated biorefineries where a number of additional bio-based products are produced in addition to renewable transportation fuels and heat and power. The biorefinery is a desirable industrial model, as utilization of waste from one process is the feedstock for another. This minimizes waste, increases sustainability and greatly increases economic viability. These facilities would very likely source from a number of different owners.

Furthermore, these secondary residues can also be one of the most low carbon and environmentally friendly sources of woody biomass. Because these materials are waste products of existing industries, they do not have a direct impact on practices or conditions in the forest. Compared to harvesting biomass directly in the woods, the use of residues does not increase traffic on forest roads, as material is generated at the mill site. Excluding these materials could be a lost opportunity.

In addition to the biomass intentionally removed during forest management activities, an important secondary source of material could be recovered from debris generated by natural disasters. Hurricanes, floods, ice damage, and other natural disasters annually destroy significant amounts of urban trees, forest growth, and wooden structures on both private and public lands. Very little of this material is recovered and put to a productive use. Instead, it is landfilled, incinerated, piled and burned in the field or often left in the forest (which emits greenhouse gases, including carbon dioxide, methane (which is 21 times more powerful than carbon dioxide) and air pollutants). Increasing the recovery rate for this material would be beneficial for a number of reasons, including emergency clean-up, reduction of fire hazard, recovery of economic losses, and as a potentially significant feedstock for production of renewable fuels. The availability of this material is difficult to predict, as it depends largely on chance events. Infrequent, large-scale disasters (like Hurricane Katrina, for example) have the potential to contribute additional millions of dry tons of woody biomass when they do occur. Moreover, since all materials are subject to the appropriate lifecycle analysis and some materials are totally excluded from the RFS all together an uneven playing field is created, making some materials favored over others (because some materials will be more difficult to track than others); again creating illogical barriers to available feedstocks which are waste materials generally considered a societal and environmental problem.

One illustration of this is the Gulf Coast Energy Inc.'s wood waste-to-ethanol pilot-scale facility in Livingston, Alabama. It is expected to go online this month and is capable of producing 200,000 gallons of ethanol and 30,000 gallons of biodiesel annually.[26] The fuel will be sold at a reduced rate to the City of Hoover, Alabama, which is already using leftover cooking oil to produce biodiesel at a cost of $0.75 per gallon. The city, whose employees have been busy collecting enough downed trees, branches, and limbs from storms to produce 350,000 gallons of biofuel, is expecting to save at least $1 per gallon on fuel compared to what it is spending now and is planning for its entire fleet of more than 340 vehicles to become self-sufficient in energy by the end of the year.[27]

Gulf Coast Energy Inc. is also planning to build three commercial-scale wood waste-to-ethanol facilities in Livingston, Alabama; Mossy Head, Florida, and Jasper,

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[25] Table F9a: "Total Petroleum Consumption Estimates by Sector, 2006." Energy Information Administration. *http://www.eia.doe.gov/emeu/states/sep_fuel/html/fuel_use_pa.html* (accessed July 21, 2008).

[26] McGraw, Tommy. "Second in a series about Livingston's new ethanol/bio-diesel plant." Gulf Coast Energy, Inc.

[27] Gulf Coast Energy, Inc. "In the News."

Tennessee. The company plans to use a carbon-neutral, zero-emission process[28] and take advantage of the synergies of ethanol and biodiesel production by combining the production of these biofuels into a single facility. The company will use the glycerin byproduct from biodiesel production with its biomass gasification technology to produce ethanol; the methanol stream created during ethanol production will be used during the biodiesel production process.[29] By the end of 2009, Gulf Coast Energy Inc. plans to complete Phase I, which entails producing 10 million gallons of biodiesel and 35 million gallons of ethanol annually at all three commercial-scale facilities. Plants may be expanded after the process is proven successful.[30] The Mossy Head, FL, facility received a $7 million Florida Farm to Fuel Grant for the company's $62 million project.[31] These are the kind of innovative solutions we are seeking to solve our climate and energy problems.

Nonindustrial Private Forest Owners and Encroachment

By giving preference to plantation forests, the *renewable biomass* definition favors the owners of large, industrial forest plantations over the nonindustrial private forest owners (NIPF), who generally do not have the capital to use artificial regeneration. NIPFs contain the majority of diverse, mixed-species woodlands in the nation. Not only do these forests generally boast higher biodiversity than plantations, but the periodic income from selective harvesting on these properties is often the only thing standing between these forests and the very real pressure to sell out to land speculators and real-estate developers.

According to a report released by the Southern Forest Resource Assessment[32] of the U.S. Department of Agriculture, it is expected that approximately 12 million acres of timberland in the Southeast will be lost due to urbanization between 1992 and 2020. An additional 19 million acres is expected to be lost between 2020 and 2040 assuming that trends established in the 1990s persist. The loss of timberland is expected to be concentrated near urban centers such as Charlotte, Raleigh, Atlanta, Nashville, and throughout much of Florida while rural areas in Arkansas and Mississippi may gain timberland. The report does state that moderate increases in timber prices combined with unchanging agricultural returns could offset much of the loss due to urbanization by allowing crop and pasture land to be converted to forest uses. On the other hand if timber prices remain unchanged, it can be expected that a total of 31 million acres of forestland could be lost to urbanization by 2040. The renewable fuels market has real potential to provide additional value to forests while helping to keep family forests off the auction block.

Furthermore, according to estimates made for Range Fuels using data from the USDA Forest Service Forest Inventory and Analysis Program (FIA),[33] over 76 percent of forests in 10 southeastern states do not qualify as forest plantations. In Georgia and Alabama, two of the biggest timber producing states, this definition would exclude 67.6 percent and 70.9 percent of private forests, respectively. Range Fuels Director of Project Development Ron Barmore said this when discussing the limitations of the current RFS,

> *"Range Fuels is very concerned about ambiguity in the current definition of Renewable Biomass in the Energy Policy and Security Act that, under some interpretations, could severely limit the potential benefits that can be derived from the advancement of cellulosic ethanol production. The vast majority of commercial timber that is grown and logged for the forest products industry is harvested from naturally regenerated forests."*[34]

These percentages are surprisingly high given the enormous importance of plantation forestry to the economy and culture of the southeastern states. In many other regions, such as New England, the acreage of qualifying private forest plantation will be almost non-existent.

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[28] Reeves, Steve. "Livingston Plant's Efforts May Yield New Energy Source." Gulf Coast Energy, Inc. June 19, 2008.

[29] Santosus, Melissa. *Exec Digital.* "Exploiting Potential in Renewable Fuels." April 2008. 289–290.

[30] Santosus 2008, 290–291.

[31] Florida Department of Agriculture and Consumer Services. "Farm to Fuel Grants Program Winners." January 22, 2008.

[32] Wear, D.N., D.R. Carter, and J. Prestemon. "The U.S. South's Timber Sector in 2005: A Prospective Analysis of Recent Change." *Southern Forest Resource Assessment,* 2007.

[33] Range Fuels, unpublished data.

[34] In an e-mail message to the Jetta Wong on July 22, 2008.

Stakeholder Support for Biomass From Forests

As more and more acres of forestland are bulldozed to make way for suburbia, burned in massive conflagrations, or destroyed by pests, a number of environmental organizations are beginning to see the value in sustainable, multiple value forest management for helping to ensure the perpetuation of diverse, vibrant forest ecosystems and the many values they offer—clean water, wildlife habitat, recreational opportunities, and diverse forest products, including renewable fuels. The Pinchot Institute for Conservation came out with this statement in 2007 identifying the potential value in renewable energy to make possible a better and more sustainable form of forestry,

> *". . . wood energy could help address several longstanding challenges in sustainable forest management: treating hazardous fuels accumulations to minimize future threat of wildfires, creating economic outlets for small-diameter and low-grade wood to reduce forest degradation, and strengthening community economic development on the basis of sustainable use of local forest resources."*[35]

The problems I have identified in the current definition have received similar attention from a number of other groups and organizations. The Society of American Foresters and the National Association of State Foresters, two of the largest and most well-respected forestry organizations in the nation, have both written letters to Congress expressing their concern about the way in which forest materials are treated in the RFS. SAF is the premier national organization representing forest science, research, education and the forestry profession in the United States and is the largest forestry organization in the world. SAF publishes several of the most esteemed scholarly publications dedicated to forestry, including both *The Journal of Forestry* and *Forest Science.* In a letter to the House Committee on Energy and Commerce dated February 12, 2008, the president of SAF, Tom Thompson, wrote,

> *"At a time when considerable legislative and agency efforts are being made to address global climate change, wildfire severity, and renewable energy production, it is regrettable that a definition would be promulgated that would equally obstruct all of these goals. The current definition will interfere with the ability to remove non-merchantable, small-diameter trees from our public lands, both as renewable fuels, and as a means for addressing the increasingly devastating wildfires we are experiencing. Any notion of climate change mitigation and adaptation of existing forests to changing environmental conditions will require the maximum in management flexibility for both public and private forests, and hampering that management with an unscientific and ill-conceived renewable biomass definition is unacceptable. Finally, the definition's arbitrary limits on qualifying private forestlands can only exacerbate the land-use conversion pressures faced by our smaller, private working forest landowners."*

The National Association of State Foresters is a nonprofit organization representing the directors of the forest agencies in all the states, the U.S. territories, and the District of Columbia. In a letter to the same Committee dated February 7, 2008, Kirk Rowdabaugh, President of NASF, expressed a similar view, *"Our nation's forests can provide a ready supply of feedstock for renewable fuels, and any exclusion of woody biomass from the Renewable Fuel Standard would hamstring the nation's efforts to reduce our reliance on foreign oil."*

A number of similar letters have originated from organizations other than those dedicated to forestry, including the Western Governors' Association and 25x'25, a nonprofit organization encouraging 25 percent of our nation's energy supply to come from renewable sources by 2025. In addition to these, a number of private citizens, scientists, and local organizations have written or are in the process of writing similar letters, some of which I have submitted with my testimony. These letters express the concerns of those who work in our woodlands and forests and who understand the failure of the current definition to realize the use of forest resources for renewable energy in a way that complements sustainable management for critical ecosystem services, habitat values, biodiversity, timber resources, and recreation.

Municipal Solid Waste

One potential biofuel feedstock that is not currently included within the definition of 'renewable biomass' is some portions of organic material comprising municipal solid waste (MSW). While the RFS includes, *"Biogas (including landfill gas and sewage waste treatment gas) produced through the conversion of organic matter from* ***renewable biomass,***" (P.L. 110–140, Title II, Sec. 201[A](ii)V) the definition of *renew-*

[35] Sample, V. Alaric. *Ensuring Forest Sustainability in the Development of Wood-based Bioenergy.* Pinchot Institute For Conservation. 2007. p. 6.

able biomass only includes "*separated yard waste or food waste, including recycled cooking and trap grease*," (P.L. 110–140, Title II, Sec. 201[I](vii)). It is unclear how this definition will be implemented by EPA, specifically because most landfill gas is produced from existing landfills where a mixture of organic, inorganic and MSW already exists.

The United States already has an abundant amount of this material. EPA estimated in 2006 that 169 million tons of MSW were disposed of after recycling, including 96.81 million tons of organic material. Although per capita waste generation has been relatively stagnant since 1990 due to increased recycling rates, overall waste generation has risen as the population of the United States has continued to grow. At the same time, the number of landfills in the United States has fallen from 7,924 landfills in 1988 to 1,754 in 2006 meaning that wastes must be transported over farther distances, which consumes more fuel, currently fossil based.[36] Generation of MSW varies regionally with the highest concentration located in urban areas. In 2007, New York City generated 3.6 million tons of MSW and spent $283.3 million to export its waste to landfills outside of the city.[37] As of 2006, only 12.5 percent of the MSW generated in the United States before recycling was combusted for energy recovery.[38] The Energy Information Administration (EIA) has estimated that the electricity generated from MSW totaled 9 million MWh in FY 2007 with an additional 6 million MWh generated from landfill gas.[39]

As these statistics show, there is a significant amount of organic material that must be disposed of after recycling. Even though MSW is not currently included in the Renewable Fuel Standard, several states including Maryland[40] and New Jersey[41] currently include it in their Renewable Portfolio Standards for energy and Pennsylvania[42] includes MSW as part of its Alternative Energy Portfolio Standard. The State of Hawaii currently includes MSW as a potential source of renewable energy as part of its Renewable Portfolio Standard and includes MSW as a potential feedstock for ethanol production in its Ethanol Facility Tax Credit.[43] Even other Federal policies allow for the use of MSW for biofuel production. In the Department of Energy's Integrated Biorefinery and Demonstration grant program of the Energy Policy Act of 2005 (EPAct 2005, P.L. 109–58), the definition of biomass notes "*any waste material that can be converted to energy is segregated from other waste materials*". The only explicit exclusion of MSW pertains to wood waste materials including paper waste.[44] According to this definition, some organic portions of MSW including food waste would be included. This section of the EPAct 2005 is the basis for several large grants given to commercial-scale biorefinery projects, a series of which were awarded in 2007 including BlueFire Ethanol, which plans to use portions of MSW as a potential feedstock.[45] The enactment of the RFS was suppose to be a clear signal to investors of the government's commitment to renewable fuels as a part of the country's energy and greenhouse gas reduction strategies. Unfortunately this restrictive definition and the government's mixed signals illustrated in the different definitions of biomass may not be the clear signal intended.

Although waste-to-biofuel conversion technologies are similar to other cellulosic feedstock technologies, there are several unique challenges to utilizing MSW as a feedstock. One challenge in converting MSW to biofuels is pollution control. In any waste stream there will be chemicals and substances of concern and although the fuel derived from MSW will be clean, other materials may still contain contaminants. It must be noted, though, that traditional waste-to-energy generation has made significant progress in reducing emissions of pollutants. This is largely due to the implementation of scrubbers to remove acids as well as filters to remove par-

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[36] Environmental Protection Agency. "Municipal Solid Waste Generation, Recycling and Disposal in the United States: Facts and Figures for 2006." Environmental Protection Agency, 2007.

[37] Niblack, P. "More Recycling Needed to Help Lower City's Trash Costs." New York City Independent Budget Office, 2007.

[38] Environmental Protection Agency, 2007.

[39] Energy Information Administration. "Federal Financial Interventions and Subsidies in Energy Markets 2007." Energy Information Administration, 2008.

[40] Md. Code, Com. Law § 7–701.

[41] New Jersey Clean Energy Program. "Renewable Energy Compliance Certification Forms for the State of New Jersey." New Jersey.

[42] 73 Pa. Cons. Stat. § 1648.2.

[43] Haw. Rev. Stat. § 235–110.3

[44] Energy Policy Act of 2005 § 932(a), 42 U.S.C. § 923(a) (2005).

[45] Department of Energy. "DOE Selects Six Cellulosic Ethanol Plants for Up to $385 Million in Federal Funding." Department of Energy. *http://www.energy.gov/news/4827.htm* (accessed July 16, 2008).

ticulates.[46] As MSW-to-biofuels technology becomes more mature, it can be expected that pollution controls will be developed in accordance with appropriate government regulations.

In Lake County, Indiana, there are two municipal solid waste-to-biofuel facilities that are currently under development. Genahol-Powers, LLC and Indiana Ethanol Power, Inc. are both in negotiations with Lake County officials to obtain waste disposal contracts to convert the county's waste into biofuels. It is expected that, if constructed, these facilities will process waste not only from Lake County, but also from surrounding areas including nearby Chicago. Proposed plans for Genahol and Indiana Ethanol Power have a combined capacity to produce 110 million gallons of biofuel per year while processing waste at the same time. It should be noted that Indiana Ethanol Power has received a $100,000 grant from the Indiana Office of Energy & Defense Development.[47] Under current legislation, it is unclear whether fuel produced from these facilities would be included in the RFS.

Cellulosic biofuel startup Coskata, Inc. is currently planning to construct a cellulosic ethanol demonstration facility in Madison, Pennsylvania, in coordination with General Motors. It is expected that this facility will use a variety of feedstocks such as municipal solid waste, woody biomass and steel off gases. In addition, Coskata will also use other feedstocks including agricultural wastes which are included in the RFS. Coskata's demonstration scale facility is expected to produce 40,000 gallons of cellulosic ethanol per year. The company is also planning to construct a commercial scale facility in the future at the same site producing 50–100 million gallons per year.[48] *Coskata is particularly interesting because of their ability to use multiple feedstocks.* By eliminating certain feedstocks, the government may be artificially restricting their decision-making process.

Utilization of Waste Materials Reduces Stress on Other Feedstocks

Another possible side effect of these exclusions is that they shift the entire burden of production onto non-Federal forests and agriculture land, promoting intense production and increasing the odds that unsustainable and environmentally-degrading management practices may be used. This could lead to soil erosion, reduced productivity, compromised habitat, and reductions in water quality. Among these issues are some fundamental agriculture issues, including competition for land and natural resource protection.

The competition for land is a complicated issue that stems from the perceived differences between growing crops for food, feed, fiber and now fuel. Land is the most finite of resources and ultimately the basis for all wealth—we rely on it to feed, clothe, and shelter our civilization. When land is managed in an unsustainable way, our ability to provide these and other basic values is compromised. For every acre of land that is eroded or acidified or desertified or otherwise degraded, we have one less productive acre that can provide food, biofuel feedstocks or ecosystem services. Likewise, inappropriate allocation of land for the wrong use can carry negative consequences, including adverse impacts to the environment and the economy. Fortunately, good stewardship and wise allocation of our precious land resources can provide abundant biomass for fuels, food, and diverse, healthy ecosystems.

In this respect, the wisest course of action would be to focus on feedstocks that do not compete for land resources, such as low-value forest residues and other waste materials. The RFS is a very aggressive mandate, but it is not an impossible one, as long as we do not exclude any of those feedstocks that can be produced sustainably and that meet important environmental and greenhouse gas emissions reductions. With conversion technologies still in development, we must keep our options open and strive to produce renewable fuels that meet objective and appropriate standards of sustainability. Fortunately, our nation possesses abundant and readily available feedstocks that satisfy this criterion.

Conclusion

By utilizing the renewable biomass resources from America's farms, forests, and open spaces, we have the potential to lower our greenhouse gas emissions, increase energy security, and stimulate economic development in rural communities. Renewable fuels from biomass feedstocks (coupled with increased fuel efficiency, plug-in

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[46] Environmental Protection Agency. "Solid Waste Combustion/Incineration." Environmental Protection Agency. *http://www.epa.gov/epaoswer/non-hw/muncpl/landfill/sw__combst.htm* (accessed July 8, 2008).

[47] Shaw, Dan. "Evansville Companies Bid to Make Ethanol from Lake County Trash." *Evansville Courier & Press,* June 2, 2008.

[48] Coskata, Inc. "Coskata Inc. Selects Madison, Pa. for Commercial Demonstration Facility to Produce Next-Generation Ethanol." Coskata, Inc. *http://www.coskata.com/pagebody/Madisonannouncement.htm* (accessed July 16, 2008).

hybrids, and similar technologies) provide the most immediate means to begin reducing the emissions associated with liquid transportation fuels. By adding value to forests and forest products, the renewable fuels market is one tool that can help slow down urban encroachment, improve wildlife habitat, reduce the threat of forest fires, and improve timber stocks, all while driving local economic development through the creation of jobs in rural communities.

The United States has the resources necessary to provide for our energy needs, and renewable fuels can and will play a vital role as part of a larger strategy to diversify our energy supplies. A June 2008 report released by Merrill Lynch concluded that biofuels are the single largest contributor to global oil supply growth in light of the inability of non-OPEC crude oil supply to expand. "According to the International Energy Agency, 'Biofuels have become a substantial part of faltering non-OPEC supply growth, contributing around 50 percent of incremental supply in the 2008–2013 period.'"[49] The use of domestically-produced renewable fuels extends fuel supply by displacing the amount of foreign crude oil the United States needs to import. On June 12, 2008, Alexander Karsner, DOE Assistant Secretary for Energy Efficiency and Renewable Energy, testified before the Senate Committee on Energy and Natural Resources that gasoline prices would be between 20¢ to 35¢ per gallon higher if it was not for ethanol production and use.[50] Simply put, the use of renewable fuels eases the strain of transportation costs on American consumers. Time is of the essence if the United States is to lay groundwork for a sustainable future that will mitigate climate change, reduce dependency on foreign oil, and reduce costs of transportation fuels.

I would like to thank the Committee once again for the opportunity to speak before you. Let me also extend my gratitude for your part in creating and passing this important Renewable Fuel Standard and recognizing the role it plays in our climate protection and national security efforts.

ATTACHMENTS

July 17, 2008

Federal Forests and the Renewable Fuel Standard

On December 19, 2007, the President signed into law the Energy Independence and Security Act of 2007 (EISA). This law (P.L. 110–140) includes an increase in the national Renewable Fuel Standard (RFS) mandating the production of 36 billion gallons of renewable fuels by 2022. Within the total mandate, 21 billion gallons must qualify as advanced biofuels—fuels made from renewable biomass other than corn starch. There are additional carve-outs for biomass-based diesel and fuels made from cellulosic feedstocks, such as wood, grasses, and agricultural residues. An important component of the RFS is a series of greenhouse gas emissions screens, essential safeguards that ensure renewable fuels will meet minimum verifiable reductions in greenhouse emissions. For renewable fuels (from new facilities) to qualify under the RFS, they must achieve at least a 20 percent reduction in direct and indirect lifecycle emissions compared to equivalent petroleum fuels. Advanced fuels and cellulosic fuels are subject to a 50 percent and 60 percent emissions screen, respectively. Because of these stringent safeguards and the large quantity of fuel mandated, it is paramount that we not rule out potentially important feedstocks without valid reasons. The definition of 'renewable biomass' included in the law, however, **does** rule out a number of feedstocks, including thinning materials and woody residues from Federal forests.

There are a number of reasons why the inclusion of Federal forests in the definition of renewable biomass would be beneficial for the RFS, global climate, and our public forests:

Significant Potential

- U.S. forests cover 755 million acres (Alvarez 2007), of which approximately ⅓ is managed by Federal agencies. Public forests are concentrated in the western states, especially throughout the Rocky Mountains and Alaska. Slash, unmerchantable trees and other logging residues are ***regularly*** generated within these forests as byproducts of stand improvement thinnings and forestry activities intended to promote wildlife habitat, ecosystem functioning, timber pro-

[49] Renewable Fuels Association, Canadian Renewable Fuels Association, European Bioethanol Fuel Association, and UNICA. *Financial Times.* "OPEC Rakes in Billions, but Blames Biofuels . . . Confused?" July 16, 2008.

[50] Karsner, Alexander. Assistant Secretary for Energy Efficiency and Renewable Energy. "Biofuels and the Food Versus Debate." Testimony before the U.S. Senate Energy and Natural Resources Committee. June 12, 2008.

duction, biodiversity, and recreational opportunities. In addition, biomass is regularly harvested during restorative and preventative treatments to protect against wildfire and insect infestations. According to one assessment, 5.2–7.5 million dry tons of forest biomass could be sustainably generated from hazardous fuel reduction treatments in the western states (Western Governors' Association 2005).

No Indirect Greenhouse Gas Emissions

- Current estimates of direct lifecycle emissions for cellulosic fuels show reductions in the order of 88–94 percent compared to petroleum fuels (Schmer et al. 2008, Union of Concerned Scientists 2007). However, the emissions requirements in the RFS explicitly include both **direct *and* indirect emissions.** Recent publications (Searchinger et al. 2008, Fargione et al. 2008) highlight the potential magnitude of indirect emissions caused through agricultural displacement globally. These emissions occur when production on arable land shifts from food products to biofuel feedstocks. Since global demand for foodstuffs is fairly inelastic, this decrease in supply is met by clearing new lands for agriculture, resulting in greenhouse gas emissions from deforestation, fires, and erosion. To make matters worse, clearing often occurs in rainforests, wetlands, native grasslands, and other imperiled ecosystems. Although indirect emissions could become a major obstacle to producing biofuel feedstock on agricultural land, more research is needed to understand how to fully determine these effects. In the meantime, prudency would suggest that we place greater emphasis on those feedstocks which do not impact the supply of agricultural commodities and therefore will not result in such a chain reaction. This includes waste materials, such as agricultural residues, food processing byproducts, yellow grease, and urban wood waste, and feedstocks produced on non-agricultural land, such as algae and woody biomass **from *existing* forestlands**—including the extensive managed areas of our Federal forests.

Cost-effective Tool for Sustainable Forest Management

- Not only can woody biomass contribute substantially to the production of sustainable biofuels, but biomass utilization can be a valuable tool to help improve stand conditions and facilitate management on those public forests that could benefit from increased thinning of small-diameter and low-quality trees. Small-diameter thinning is a major component of hazardous fuels reduction on lands identified as being at risk from catastrophic wildfire. Since 2000, the National Fire Plan has included hazardous fuels reduction as a key element of national fire policy (USDA and DOI 2000). Large, catastrophic fires destroy life and property, threaten communities, reduce air quality, and release huge pulses of greenhouse gases. One study estimates that large, stand-replacing fires can emit over 2 tons of carbon per hectare (Finkral and Evans 2007). **Where and when appropriate,** hazardous fuels reduction can decrease fire intensity, fire frequency, and fire velocity, as well as the likelihood that a fire will evolve into a highly destructive crown fire (Duvenek and Patterson 2007, Agee and Skinner 2005, Brose and Wade 2002, Pollet and Omi 2002, Finney 2001, Fule et al. 2001, Stephens 1998, Kalabokidis and Omi 1998, Weatherspoon and Skinner 1996). **In order to be successful in these objectives and avoid negative environmental impacts, however, hazardous fuel reduction treatments must be carefully tailored to the forest type, historical fire regime, geography, and ecological characteristics of the stand being treated.** After thinning, slash and harvest residues should be treated on site or transported out of the forest to avoid increased fire risks among accumulated low fuels (Bolding and Lanford 2001, Kalabokidis and Omi 1998, Stephens 1998). Currently, the majority of thinning materials are chipped, ground or burned on site (U.S. Government Accountability Office 2007). The intentional burning of residues in the field produces many of the same negative impacts as wildfires, including emissions of greenhouse gases and particulate matter (Radke et al. 1981).
- Thinning of small-diameter trees can be a valuable tool in managing Federal forests for other values and objectives in addition to hazardous fuels reduction. Thinning can result in improved tree vigor, increased drought tolerance, and increased growth by decreasing the stand density and reducing competition between trees for sunlight, water, and nutrients (Smith et al. 1996). Because vigorous fast-growing trees are generally more proof against pests, thinning can be a successful means to reduce the extent and lethality of insect infestations in many forest systems (Fettig et al. 2007, Romme et al. 2006). In addition, harvesting of small-diameter trees can be an important component of habitat man-

agement for wildlife species that require early successional habitat or low stand density (McComb 2007, Gram et al. 2003, Desseker and McAuley 2001, Hume et al. 1999). Finally, forest thinning and other silvicultural activities can have positive effects on watershed functioning, and specifically water yield (Stednick 1996, Troendle 1983), of the most essential ecosystem services from Federal forests in much of the western U.S.

- Stand improvement thinnings focusing on small-diameter trees are expensive operations; Federal budgets are inadequate to treat the vast public acreages that could benefit from this treatment (U.S. Government Accountability Office 2008). Adding costs for residual treatments (chipping, grinding, and burning) only compounds the problem. The feasibility of thinning is limited in many places by the lack of markets for small-diameter trees and woody biomass. In the absence of markets, Federal agencies almost certainly cannot afford to thin vast acreages on the public dollar—nor would this necessarily be the wisest and best use of funds. The RFS has the potential to provide necessary markets and bring a higher quality and greater range of management tools within the national budget—helping provide solutions to multiple problems.

Conclusion

Federal forests have the potential to contribute substantially to the production of sustainable biofuels. Furthermore, biomass extraction has the potential to become a powerful tool for improving the quality of management on our Federal lands. The range of options for management of wildlife habitat, forest hydrology, hazardous fuels reduction, and pest infestations could be vastly increased if markets for small-diameter trees were expanded. These markets are not likely to appear, however, if Federal forests are excluded from the RFS. A transparent and inclusive dialogue among stakeholders, interest groups, and policymakers will be a necessary step in amending this law.

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July 17, 2008

Private Forests and the Renewable Fuel Standard

On December 19, 2007, the President signed into law the Energy Independence and Security Act of 2007 (EISA). This law (P.L. 110–140) includes an increase in the national Renewable Fuel Standard (RFS) mandating the production of 36 billion gallons of renewable fuels by 2022. Within the mandate, 16 billion gallons must be produced from cellulosic feedstocks, such as wood, grasses, and agricultural resi-

dues. An important component of the RFS is a series of greenhouse gas emissions screens, essential safeguards that ensure renewable fuels will meet minimum verifiable reductions in greenhouse gas emissions. For renewable fuels (from new facilities) to qualify under the RFS, they must achieve at least a 20 percent reduction in direct and indirect lifecycle emissions compared to equivalent petroleum fuels. Cellulosic fuels are subject to a 60 percent emissions screen. Because of these stringent safeguards and the large quantity of fuels required, it is paramount that we not exclude feedstocks without valid reasons. The definition of 'renewable biomass' included in the law, however, does rule out a number of feedstocks, including some woody biomass from private forests.

The definition includes usage of "*planted trees and tree residue from actively managed tree plantations on non-Federal land cleared at any time prior to enactment . . .*" and "*slash and pre-commercial thinnings that are from non-Federal forestlands . . .*" This language limits the use of merchantable trees to those coming from tree plantations. Only logging residues and pre-commercial trees can be used from naturally-regenerated forestlands.

There are a number of reasons why a broader inclusion of private forests in the definition of renewable biomass would be beneficial for the RFS, global climate, and our forests:

Significant Potential

U.S. forests cover 750 million acres (Alvarez 2007), of which approximately 57% are owned by private citizens, families, private cooperatives, industry, investment funds, and institutions. The majority of these forests rely on natural regeneration for stand establishment instead of the artificial regeneration (i.e., planting) used in plantation forests. Furthermore, these forests are heavily concentrated in the northern and southeastern parts of the country (Alvarez 2007), where agricultural feedstocks may not be as available as they are in the Midwest and western states.

No Indirect Greenhouse Gas Emissions

Emissions restrictions in the RFS explicitly include both **direct and indirect** emissions of greenhouse gases. Current estimates of **direct** lifecycle emissions for cellulosic fuels show reductions in the order of 88–94 percent compared to petroleum fuels (Schmer et al. 2008, Union of Concerned Scientists 2007). However, recent publications (Searchinger et al. 2008, Fargione et al. 2008) highlight the potential magnitude of indirect emissions caused through land use change. These emissions are associated with the clearing of new farmland to compensate for those crops and farmlands that are diverted towards the production of biofuels. Although indirect emissions could become a major stumbling-block to producing climate-friendly biofuel feedstock on agricultural land, more research is needed to understand how to fully measure and attribute these effects. In the meantime, prudency would suggest that we place greater emphasis on those feedstocks which do not impact agricultural markets. This includes wastes and residues; such as agricultural wastes, food processing byproducts, and urban wood waste; and feedstocks produced on non-agricultural land, such as algae and woody biomass from existing forestlands—including the extensive privately-owned, naturally-regenerated forests throughout the nation.

Valuable Stewardship Tool

Biomass harvesting can be a valuable tool to help improve stand conditions in a number of forest types for a number of management values. On many acres across the nation, the restoration of historic fire regimes through hazardous fuels reduction is a management priority. In those forests where hazardous fuels reduction is warranted, appropriate use of hazardous fuels reduction can decrease fire intensity, fire frequency, and fire velocity, as well as the likelihood that a fire will evolve into a highly destructive crown fire (Duvenek and Patterson 2007, Agee and Skinner 2005, Brose and Wade 2002, Pollet and Omi 2002, Finney 2001, Fulé et al. 2001, Stephens 1998, Kalabokidis and Omi 1998, Weatherspoon and Skinner 1996). **In forests where stand conditions (and associated fire regimes) have radically departed from the past, restoration of historical conditions may require vegetation management across a wide spectrum of tree species, ages, and sizes—not only the removal of "*slash and pre-commercial thinnings*" allowed by the current definition.** In addition to fire management, biomass harvesting has the potential to be an important component of management for other values and objectives. Thinning can be used to improved tree vigor, increase drought tolerance, and increase growth by decreasing the stand density and reducing competition among trees for sunlight, water, and nutrients (Smith et al. 1996). Because vigorous, healthy trees are generally more resistant to pests, thinning can be a successful means to reduce the extent and lethality of insect infestations in many forest

systems (Fettig et al. 2007, Romme et al. 2006). Restoration and improvement of wildlife habitat in many circumstances depends on harvesting trees and forest biomass (McComb 2007, Gram et al. 2003, Desseker and McAuley 2001, Hume et al. 1999). Like restoration of historic fire regimes, **restoration or creation of specific habitat components may require management of a variety of trees other than just small trees and brush.** The removal of biomass of all size-classes is also a regular component of management for a number of other forest values, including recreation, aesthetics, and watershed functioning (Stednick 1996, Troendle 1983).

The RFS Definition and Sustainability

The definition of 'renewable biomass' included in the RFS was crafted to serve a laudable purpose—to ensure that the RFS provides incentives for sustainable stewardship of our nation's precious forest resources. Unfortunately, the current definition is NOT based on ecologically meaningful sustainability criteria. Instead, it is an arbitrary series of exclusions based on ownership and regeneration systems. As result, **material from the most poorly managed forest plantations is eligible to be included in the RFS while trees from well-managed, sustainably-harvested Federal and private forests are not.** Indicators and criteria of sustainability need to be based on objective, ecologically meaningful factors such as forest type, climate, topography, soil characteristics, fire regime, and local biodiversity. Sustainable forestry is not a simple concept; it means tailoring management practices to achieve multiple objectives, while improving and maintaining the productivity and ecological functioning of forested ecosystems—far more than simply avoiding the cutting of large trees.

Conclusion

Private forests and woodlands have the potential to contribute substantially to the production of sustainable biofuels and be a powerful tool for improving the quality of stewardship in many forests for a number of values, including wildlife habitat, forest hydrology, hazardous fuels reduction, and pest management. To this end, it is essential that biofuel incentives promote sustainable management practices. The broad exclusions included in the Renewable Fuel Standard (RFS), however, are not appropriate. **A transparent and inclusive dialogue among stakeholders, interest groups, and policymakers will be a necessary step in developing a new definition that is flexible enough to utilize sustainably-produced woody biomass from all ownerships and regions where it is be an appropriate and sustainable management tool.**

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February 12, 2008

The Honorable John D. Dingell
Chairman
Committee on Energy and Commerce
United States House of Representatives
Rayburn House Office Building
Washington, DC 20515

The Honorable Joe Barton
Ranking Member
Committee on Energy and Commerce
United States House of Representatives
Rayburn House Office Building
Washington, DC 20515

Re: *Renewable Biomass* definition

Dear Chairman Dingell and Ranking Member Barton:

We wish to express both our concern with the definition enacted in the Energy Independence and Security Act of 2007 (P.L. 110—140), and our support for the efforts of this committee to amend that definition in a manner best suited to meeting our nation's energy needs, as well as the equally important conservation and restoration needs of our public and private forests.

The existing definition in Title II artificially excludes from consideration as "renewable biomass" wood fiber generated from federal public lands, and from private lands other than those "actively managed" as plantations. This definition is needlessly narrow, and will serve to frustrate not only renewable energy production, but other forest management goals across the nation.

At a time when considerable legislative and agency efforts are being made to address global climate change, wildfire severity, and renewable energy production, it is regrettable that a definition would be promulgated that would equally obstruct all of these goals. The current definition will interfere with the ability to remove non-merchantable, small-diameter trees from our public lands, both as renewable fuels, and as a means for addressing the increasingly devastating wildfires we are experiencing. Any notion of climate change mitigation and adaptation of existing forests to changing environmental conditions will require the maximum in management flexibility for both public and private forests, and hampering that management with an unscientific and ill-conceived renewable biomass definition is unacceptable. Finally, the definition's arbitrary limits on qualifying private forest lands can only exacerbate the land-use conversion pressures faced by our smaller, private working forest landowners.

We commend your committee's current efforts to craft a more scientifically, socially, and ecologically appropriate definition that will balance the pressing management needs across our nation's forests, while at the same time safeguarding the important environmental and societal values provided by our forested lands. We would urge serious consideration of the bipartisan definitional approach taken by Representative Herseth-Sandlin (H.R. 5236) as a template for House action. And as always, we remain poised to assist with these efforts.

Respectfully,

Tom Thompson
President, SAF

NATIONAL ASSOCIATION OF STATE FORESTERS
444 North Capitol Street, NW, Suite 540, Washington, DC 20001

February 7, 2008

The Honorable John Dingell
US House of Representatives
Washington DC

The Honorable Joe Barton
US House of Representatives
Washington DC

Dear Chairman Dingell and Ranking Member Barton,

The National Association of State Foresters (NASF) urges Congress to modify the definition of renewable biomass in the Renewable Fuel Standard (RFS) provision. As currently written, the definition restricts the types of feedstock that can be used as well as limiting where that feedstock can originate. Our nation's forests can provide a ready supply of feedstock for renewable fuels, and any exclusion of woody biomass from the Renewable Fuel Standard would hamstring the nation's efforts to reduce our reliance on foreign oil.

As it stands, the definition in the Energy Bill would severely constrain the ability of non-federal forest lands to supply feedstock to our nation's burgeoning appetite for biomass. Mandating that the over two-thirds of our nation's forests that fall outside of federal ownership can only supply feedstock as a byproduct of other production, ignores the fact that our state and private forests can supply biomass effectively and in an environmentally sustainable manner. Limiting the ability of forest landowners to profit from their forests increases the likelihood that the forest will subsequently be converted to some form of non-forested development.

The current definition also completely eliminates the ability of our National Forests to supply feedstock for renewable fuels. With overstocked conditions existing throughout the National Forest System, permitting our public lands to supply feedstock would provide a multitude of benefits, including improved overall forest health and the reduction of the hazardous fuels that serve as the lynchpin for catastrophic wildfire. Leaving National Forests out of the Renewable Fuel Standard would curtail our ability to create economical renewable fuels, and further hamper attempts to reduce the effects of wildfire.

NASF strongly urges Congress to take another look at the renewable biomass definition in the renewable fuels standard. The benefits of our nation's forest need not be mutually exclusive, and our nation's energy policy cannot afford to ignore this ready source of biomass. Thank you for your effort and NASF looks forward to working with you to achieve this important modification.

With warm regards,

Kirk Rowdabaugh
NASF President

WESTERN
GOVERNORS'
ASSOCIATION

Dave Freudenthal
Governor of Wyoming
Chairman

Jon M. Huntsman, Jr.
Governor of Utah
Vice Chairman

Pam O. Inmann
Executive Director

Headquarters:

[Redacted]

Washington, D.C. Office:

[Redacted]

www.westgov.org

April 17, 2008

The Honorable Jeff Bingaman, Chairman
The Honorable Pete V. Domenici, Ranking Member
Senate Committee on Energy and Natural Resources
304 Dirksen Senate Building
Washington, DC 20510

The Honorable Tom Harkin, Chairman
The Honorable Saxby Chambliss, Ranking Member
Senate Committee on Agriculture, Nutrition and Forestry
328 Senate Russell Office Building
Washington, DC 20510

The Honorable Nick J. Rahall, Chairman
The Honorable Don Young, Ranking Member
House Committee on Natural Resources
1324 Longworth House Office Building
Washington, DC 20515

The Honorable Collin C. Peterson, Chairman
The Honorable Bob Goodlatte, Ranking Member
House Committee on Agriculture
1301 Longworth House Office Building
Washington, DC 20515

Dear Chairmen Bingaman, Harkin, Rahall, and Peterson & Ranking Members Domenici, Chambliss, Young and Goodlatte:

The Western Governors' Association supports changes to the existing definition of renewable biomass in the *Energy Independence and Security Act of 2007*. We are concerned that the current definition in Section 211 limits slash and pre-commercial thinnings to those removed from non-federal forestlands. The West has tremendous wildfire and forest health problems which require significant reductions in hazardous fuels across the landscape, on both public and private lands. We believe that the current renewable biomass definition should be amended to include biomass from hazardous fuels reductions on federal lands.

We understand the interest to encourage sustainable, appropriately scaled private sector investment in cellulosic biofuels. However, we believe there are better ways to ensure sustainability that do not reduce our ability to reduce hazardous fuels and stifle smart private sector investment and solutions to our collective problems.

The Honorable Jeff Bingaman, Chairman
The Honorable Pete V. Domenici, Ranking Member
The Honorable Tom Harkin, Chairman
The Honorable Saxby Chambliss, Ranking Member
The Honorable Nick J. Rahall, Chairman
The Honorable Don Young, Ranking Member
The Honorable Collin C. Peterson, Chairman
The Honorable Bob Goodlatte, Ranking Member
April 17, 2008
Page 2

We believe expanding the renewable biomass definition to include materials from federal lands will help us address two significant issues facing the West: reducing wildfire threats and diversifying our energy sources. Western Governors believe we have the blueprints in hand to guide decisions on biomass use through our reports: *10-Year Comprehensive Wildfire Strategy*; the *Clean Energy*, *Strong Economy and a Healthy Environment*; and *Transportation Fuels for the Future*.

Thank you for your consideration. Please let us know if you would like to discuss this issue further.

Sincerely,

Dave Freudenthal
Governor of Wyoming
WGA Chair

Jon M. Huntsman, Jr.
Governor of Utah
WGA Vice-Chair

[Redacted] [Redacted]

The Honorable John Dingell
Chairman
Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

The Honorable Joe Barton
Ranking Member
Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

February 25, 2008

Dear Chairman Dingell and Ranking Member Barton:

We write to express our concern over the definition of "renewable biomass" enacted in the Energy Security and Independence Act of 2007 (PL 110-140) and to express support for an adjustment to the definition that would reflect the vision of the 25x'25 Resolution that passed out of your Committee and was passed by Congress within the same Energy Security and Independence Act of 2007.

In order for America to achieve the vision set out in the 25x'25 Resolution we must incorporate a wide variety of biomass into production of biofuels, particularly if we want to achieve the new Renewable Fuel Standard (RFS) mandate. The exclusion of thinnings from federal forestlands and from naturally grown forests eliminates a significant source of cellulosic feedstock that could otherwise be available for the production of renewable fuels. The expanded Renewable Fuel Standard enacted as a part of the Energy Independence and Security Act of 2007 calls for a total of 36 billion gallons of renewable fuels by 2022, with 21 billion gallons coming from advanced biofuels to meet a significant reduction in greenhouse gas emissions.

The current definition excludes woody biomass from thinnings of federal forest lands except in the immediate vicinity of communities at-risk to catastrophic wildfires. It also excludes significant acreages of private nonindustrial forestlands which do not fall within a "managed plantation" category. A third of America's land base is forested and nearly 60 percent is held by private nonindustrial landowners.

The narrow scope of the current definition of renewable biomass also eliminates an incentive for forest land managers to thin and remove hazardous fuels and thereby reduce the risk of catastrophic wildfires, the costs to the American taxpayers in fighting such fires, and the significant greenhouse gas emissions that emanate from such wildfires. The

definition as it now stands also removes potential markets and viable economic options for private forest landowners and public land managers who have acreages in need of thinning for a variety of sustainable forest management practices.

We urge you to incorporate a more expansive definition of "renewable biomass" so that our Nation's forests and woodlands can benefit from the implementation of sustainable forest practices and contribute their full potential to renewable fuel development and greenhouse gas reduction measures. The full greenhouse gas reduction potential of the forest sector, as well as its significant contribution to biofuel mandate will only be realized if the biomass definition is expanded.

We urge, as you evaluate the best policies for environmental protection and the best options for safe and environmentally beneficial expansion of renewable fuels, that you consider the bipartisan biomass definition proposal developed by Representative Herseth-Sandlin (H.R. 5236) for House action.

Thank you for considering our view on this important matter.

Sincerely,

25x'25 National Steering Committee

Read Smith

Bill Richards

Read Smith
25x'25 Co-Chair

Bill Richards
25x'25 Co-Chair

Cc: The Honorable Speaker Nancy Pelosi
The Honorable Minority Leader John Boehner

July 22, 2008

The Honorable Nancy Pelosi
Speaker of the House
U.S. House of Representatives
Office of the Speaker
H-232, U.S. Capitol
Washington, DC 20515

The Honorable Steny Hoyer
Majority Leader
U.S. House of Representatives
1705 Longworth House Office Building
Washington, DC 20515

The Honorable John A. Boehner
Minority Leader
U.S. House of Representatives
1011 Longworth House Office Building
Washington, DC 20515

The Honorable John D. Dingell
Chairman
Committee on Energy and Commerce
U.S. House of Representatives
2328 Rayburn House Office Building
Washington, DC 20515

The Honorable Joe Barton
Ranking Member
Committee on Energy and Commerce
U. S. House of Representatives
2109 Rayburn House Office Building
Washington, DC 20515

Dear Speaker Pelosi, Majority Leader Hoyer, Minority Leader Boehner, Chairman Dingell, and Ranking Member Barton;

Re: Renewable Biomass Definition in the RFS

In December of 2007, the President signed the Energy Independence and Security Act of 2007 (EISA) into law. Among a number of other energy measures, this law (PL 110-140) includes an increase in the national Renewable Fuel Standard (RFS) mandating the production of 36 billion gallons of renewable fuels by 2022. This is a large quantity of fuels and there is justifiable concern that production of renewable fuels does not result in adverse environmental impacts. For this reason, the law includes a definition of "renewable biomass" intended to incentivize the use of biomass feedstocks derived from sustainable sources.

The definition of 'renewable biomass' that was included in the final version law, however, **does not address sustainability, best management practices, or good stewardship of natural resources.** What it does do is exclude a wide selection of feedstocks based on ownership and broad classification of landscapes. The most egregious exclusions are those related to woody biomass from forest landscapes. The definition allows for "*planted trees and tree residue from actively managed plantations*" and "*slash and pre-commercial thinning that are from non-federal forestlands.*" Federal forests are entirely excluded. **The fundamental problem with this approach is that it is divorced from objective, meaningful measures of sustainability.** The definition includes residues from private plantations regardless of how poorly they are managed and excludes materials from even the best-managed federal forest. Many of these federal forests are in need of active management. **Thinning, tree harvesting, biomass extraction, and other silvicultural activities are effective means for accomplishing a wide variety of objectives among a wide variety of forest types and stand conditions.** Wildlife habitat, fire dynamics, hydrology, and infestation dynamics are all affected by the decision to manage or not manage forest landscapes. The appropriate management activities for a given forest landscape depend on management objectives (habitat, hazardous fuel reduction, biodiversity, timber, etc.) and a number of inherently local site characteristics, such as forest type, soil, stand structure, available water, etc. Forests are diverse ecosystems and good stewardship depends on acknowledging that diversity and acting accordingly.

The undersigned are members of the forest science community; researchers and faculty from a number of universities and research facilities. We would like to emphasize the following points:

1) Forestry legislation should be based on sound science and the input of forest scientists and researchers should be considered alongside that of other stakeholders.

2) Forests are diverse systems and good forestry legislation will allow for management decisions to be made at stand and landscape level, based on ecologically-meaningful criteria.

3) Safeguards included in the RFS should be based on objective measures of sustainability that are determined at the stand level based on forest type, site characteristics, and management objectives. To this end, a management plan is an essential tool for envisioning and moving towards the desired future condition of the forest. The RFS has great potential to incentivize extraction of low-quality material in those forests where this activity is desired for hazardous fuel reduction, habitat improvement, management for biodiversity, and other objectives. The RFS should facilitate, not be a barrier to, these stand improvement activities.

Signed,

David Wm. Smith, PhD.
Shelton H. Short, Jr. Emeritus Professor of Forestry
Virginia Polytechnic Institute and State University

Past-President, Society of American Foresters

Chadwick D. Oliver, PhD.
Pinchot Professor of Forestry and Environmental Studies
Director, Global Institute of Sustainable Forestry
Yale University

James N. Long, PhD.
Professor of Silviculture and Forest Ecology
Utah State University, Logan

Kevin L. O'Hara, PhD.
Professor of Silviculture
University of California, Berkeley

Cc:

House Committee on Agriculture:
The Honorable Colin Peterson, Chair
The Honorable Bob Goodlatte, Ranking Member
The Honorable Tim Holden, Vice Chair
The Honorable Mike McIntyre
The Honorable Bob Etheridge
The Honorable Leonard L. Boswell
The Honorable Joe Baca
The Honorable Dennis Cardoza
The Honorable David Scott
The Honorable Jim Marshall
The Honorable Stephanie Herseth Sandlin
The Honorable Henry Cuellar
The Honorable Jim Costa
The Honorable John T. Salazar
The Honorable Brad Ellsworth
The Honorable Nancy Boyda
The Honorable Zachary T. Space
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The Honorable Jerry Moran
The Honorable Robin Hayes
The Honorable Timothy V. Johnson
The Honorable Sam Graves
The Honorable Michael D. Rogers
The Honorable Steve King
The Honorable Marilyn Musgrave
The Honorable Randy Neugebauer
The Honorable Charles W. Boustany, Jr.
The Honorable John R. Kuhl
The Honorable Virginia Foxx
The Honorable R. Michael Conaway
The Honorable Jeff Fortenberry
The Honorable Jean Schmidt
The Honorable Adrian Smith
The Honorable Tim Walberg
The Honorable Robert E. Latta

House Committee on Energy and Commerce:
The Honorable Henry A. Waxman
The Honorable Edward J. Markey
The Honorable Rick Boucher
The Honorable Edolphus Towns
The Honorable Frank Pallone, Jr.
The Honorable Bart Gordon
The Honorable Bobby L. Rush
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The Honorable Diana L. DeGette, Vice Chair
The Honorable Lois Capps
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The Honorable G.K. Butterfield
The Honorable Charlie Melancon
The Honorable John Barrow
The Honorable Baron P. Hill
The Honorable Doris O. Matsui

The Honorable Ralph M. Hall
The Honorable Fred Upton
The Honorable Cliff Stearns
The Honorable Nathan Deal
The Honorable Ed Whitfield
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The Honorable Greg Walden
The Honorable Lee Terry
The Honorable Michael A. Ferguson
The Honorable Michael J. Rogers
The Honorable Sue Wilkins Myrick
The Honorable John Sullivan
The Honorable Timothy F. Murphy
The Honorable Michael C. Burgess
The Honorable Marsha Blackburn

CREDENTIALS:

David Wm. Smith, PhD.
Shelton H. Short Jr. Emeritus Professor of Forestry, Virginia Tech.
Past-President, Society of American Foresters

Dr. Smith has forty-one years of experience in forestry education, research, and technology transfer with an emphasis on the silviculture, and soil-site-plant relationships of eastern U.S. forests. He has developed and taught courses and educational programs in urban forestry, and programs for continuing professional forestry education. Dr. Smith is the author or coauthor of more than 70 research papers and proceedings related to forest management and has provided professional forestry testimony before US Congressional Committees/Panels on five occasions. He is a Past-President and Fellow in the Society of American Foresters, a Member of the Virginia Board of Forestry, a Member of Virginia Forestry Educational Foundation Board of Directors, and a Captain, USN – Retired.

Chadwick D. Oliver, PhD.
Pinchot Professor of Forestry and Environmental Studies, Yale University
Director, Yale Global Institute of Sustainable Forestry

Dr. Oliver's research during the 1970's and 1980's focused on the basic understanding of how forests developed and how silviculture could be applied to ecological systems most effectively. Much of this work is incorporated in a book he wrote entitled Forest Stand Dynamics (1990, an update edition in 1996) with a former student as co-author. He has continued this work; during the past decade he has also examined how this understanding can help resolve scientific, technical, and management issues at the landscape and policy levels. He is currently working or landscape approaches to management and is involved in the technical tools, the policies, the management approaches, and the educational needs. He was a member of the Science Panel at President Clinton's Forest Conference in 1993, has testified at United States Senate and House c Representatives Committee Hearings, and has served on or chaired various scientific panels for the United States and Washington State executive and legislative branches of government. He was recently chair of the Forest Health Report science panel, presented to the United States House of Representatives and member of both a United States Senate Scientific Panel and a Society of American Foresters national task force to review national forest management legislation.

Dr. Oliver is the author of more than 100 scientific and technical papers on forest science subjects and has considerable experience advising public and private forest resource organizations in the United States and abroad. His work has taken him to all parts of the United States and to Canada, Mexico, Turkey, Nepal, Japan, Thailand, Sweden, Finland, Russia, Ecuador, Germany, and France.

James N. Long, PhD.
Professor of Silviculture and Forest Ecology, Utah State University, Logan

Dr. Long's research, and that of his graduate students, spans a broad range of the continuum from basic to applied forest ecology. His goal is to conduct research which will make a demonstrable difference in wildland resource management.

Specifically, Dr. Long's research program is in forest ecology and silviculture. He studies the structure and function of forest populations and communities--for example, stand dynamics and production ecology. Through his work, Dr. Long seeks to provide a basic understanding of forest populations for those who manage forest vegetation.

Kevin L. O'Hara, PhD.
Professor of Silviculture, University of California, Berkeley

Dr. O'Hara's research involves integrating stand dynamics into stand- and landscape-level decision-making. Stand dynamics generally refers to changes in stand structure and related processes over time. With a good understanding of stand structure and stand development, silviculturists and other forest managers can anticipate changes in structure and make appropriate interventions to meet management objectives. These management objectives may involve enhancing wildlife habitat, restoring ecosystem function, or growing trees for timber production.

Other research has involved reconstruction of mixed-species stand development to compare growth rates of different species. Patterns of height growth development can vary between species enabling mixed-species stands to form multistrata canopies. These multistrata canopies can meet some management objectives not met by single-species stands that under many management regimes lack structural variability. Finally, a major portion of his research effort is focused on decision support tools to assist managers making silvicultural decisions. These decision support systems include models which predict stand growth, decision keys for prioritizing stands for pre-commercial thinning treatments, expert systems for prioritizing silvicultural treatments, and the development of stocking guidelines for single-species, mixed-species, and multi-aged stands.

The CHAIRMAN. Thank you, Ms. Wong. Mr. Blazer.

STATEMENT OF ARTHUR "BUTCH" BLAZER, FORESTER, STATE OF NEW MEXICO; EXECUTIVE MEMBER, COUNCIL OF WESTERN STATE FORESTERS; EXECUTIVE MEMBER, NATIONAL ASSOCIATION OF STATE FORESTERS, SANTA FE, NM

Mr. BLAZER. Thank you, Mr. Chairman, Ranking Member, Members of the Committee. I appreciate the opportunity to speak with you about this issue of great importance to the western United States and my State of New Mexico. I am Butch Blazer, the New Mexico State Forester and Executive Member of the Council of Western State Foresters as well as the National Association of State Foresters.

I am representing the Council of Western State Foresters today. The Council is comprised of 17 western state foresters and six western territorial highland foresters. The Council's mission is to ensure the sustainability and health of western forests to meet today's needs and the needs of future generations. It is the mission that has compelled me to testify before you on the impact of the 2007 Energy Bill's definition of *renewable biomass* within the Renewable Fuel Standard goal section of the bill.

As a member of the Western Council and the National Association, I am uniquely qualified to address the issue that is on the minds of many of my peer state foresters. I represent a diverse group of government foresters and resource managers who are responsible to their people and their natural resources.

Congress took up the issue of energy security for our country in the 2007 Energy Bill and spent many months of hearings and testimonies on the importance of this issue, as well as the many factors that must be integrated into the final version of a successful bill. The Renewable Fuel Standard section of 2007 Energy Bill that was marked up and approved by the jurisdictional Committees was a solid draft and contained a workable definition of *woody biomass*. However a last-minute change to the definition of *renewable biomass* changed the bill in a significant manner.

The 2007 Energy Security and Independence bill signed by the President now includes an overly restrictive definition of *renewable biomass* that has created unfortunate consequences for the implementation of a responsible resource management strategy consistent with the purposes of the bill itself.

The revision was advocated by groups based on philosophies of old and result in broad, generalizing mandates that hinder our ability to restore forests, capture carbon from the atmosphere, provide clean air and water and sustain healthy, vibrant communities.

As currently codified, the definition for *renewable biomass* stipulates the conditions wherein woody biomass on Federal and non-Federal lands may be used as a resource for the production of biofuels. The revised and subsequently adopted definition of *renewable biomass* restricts the source and type of wood that could be counted towards the Renewable Fuel Standard goal, in part by restricting use of woody material from Federal lands thereby eliminating the opportunity to count towards the law's 36 billion gallon goal for renewable fuels.

This will adversely impact significant forested ecosystems, especially as our climate gets warmer, fuel loads increase, and the publicly-funded budgets to undertake needed work, such as reducing hazardous fuels, shrink. We only have to look as far as this year's fire season in my State of New Mexico, northern California, as well as states outside the West, such as Texas and North Carolina, to understand what is at stake.

Already over 3,300,000 acres have burned, and we have spent over $800 million in suppression alone this year. And that is just the wildfire end of the problem. The out-of-control wildfires themselves have the potential to turn our forests from carbon sinks into carbon sources.

Researchers from the National Center for Atmospheric Research and the University of California report that carbon emissions from fires in some states can exceed that which is emitted through human use of fossil fuels. A striking implication of very large wildfires is that a severe fire season lasting only—excuse me. I am sorry. I need to change glasses here.

The CHAIRMAN. Take your time, sir.

Mr. BLAZER. I had my glasses break on me, and I picked some up. And they are not working very well. I apologize.

Researchers from the National Center for Atmospheric Research and the University of California report that carbon emissions from fires in some states can exceed that which is emitted through human use of fossil fuels. A striking implication of very large wildfires is that a severe fire season lasting only 1 or 2 months can release as much carbon as the annual emissions from the entire transportation or energy sector of an individual state based on the NCAR study.

Further, offsetting any amounts of foreign oil with domestically-supplied renewable energy has obvious foreign policy advantages that only add to the justification that we need not artificially limit our biofuel feedstocks. The current limiting definition unjustifiably adds to the cost of business, a tough notion to swallow, considering the worsening budget and fiscal climate we are in.

I would add that the definition creates a bureaucratic nightmare that makes any use of woody biomass cost prohibitive. Imagine trying to track woody biomass that can only come from certain lands as is currently crafted. The needed systems would not be cheap nor easy for any government entity to track.

The definition also prohibits the utilization of biomass from forests that are considered rare or imperiled based on global or state rankings pursuant to the State Natural Heritage Program databases. This precludes the use of other information or programs that provide guidance on these forests such as state wildlife strategies and the forest legacy program to name a few. This is another example of some unnecessary and artificial restrictions.

Not to be overlooked is the impacts on private forestlands. I have elaborated on this in my written testimony.

Continuing, the definition also precludes the utilization of biomass from late succession or old growth forests but provides no specification for what constitutes these conditions. Biomass market investment would be discouraged even though they might otherwise encourage thinning in older stands to improve forest health or

prevent wildfire. Without specifying the conditions, the current definition will create added uncertainty into the woody biofuel equation, something that will only compound the disincentives of private sector woody biofuel investment.

Our Federal lands, which make up around 40 percent of the land ownership in the West, are important sources of cellulosic material that can and should be used toward the goals of the 2007 Energy Bill. The current measured and thoughtful approaches to the management of and uses of woody biofuels were not taken into consideration during the discussions of materials for the RFS goals.

Is there enough woody biomass? The current net growth alone of forest biomass conservatively estimated at 360 million tons per year could meet 30 percent of America's need for liquid fuel.

The CHAIRMAN. Mr. Blazer, if you could summarize and finish your testimony, sir.

Mr. BLAZER. Yes. In summary, I just feel that the material coming off of our Federal lands is going to be imperative if we are going to be able to meet the needs of protecting our life and property of our folks out West. Thank you, Mr. Chairman.

[The prepared statement of Mr. Blazer follows:]

PREPARED STATEMENT OF ARTHUR "BUTCH" BLAZER, FORESTER, STATE OF NEW MEXICO; EXECUTIVE MEMBER, COUNCIL OF WESTERN STATE FORESTERS; EXECUTIVE MEMBER, NATIONAL ASSOCIATION OF STATE FORESTERS, SANTA FE, NM

Mr. Chairman, Ranking Member, Members of the Committee, I appreciate the opportunity to speak with you about this issue of great importance to the Western United States and my State of New Mexico. I am Arthur 'Butch' Blazer, New Mexico State Forester and Executive member of the Council of Western State Foresters (CWSF) as well as the National Association of State Foresters. I am representing the Council of Western State Foresters today. The Council is comprised of 17 western state foresters and six western Territorial Island Foresters. The Council's mission is to ensure the sustainability and health of western forests to meet today's needs and the needs of future generations.

It is this mission that has compelled me to testify before you on the impact of the 2007 Energy Bill's definition of *renewable biomass* within the Renewable Fuel Standard (RFS) goal section of the bill. There are concerns that the current definition is not sustainable, meaning ecologically, economically and socially sustainable. As a member of the Western Council and National Association, I am uniquely qualified to address this issue that is on the minds of so many of my peer state foresters. I represent a diverse group of government foresters and resource managers who are responsible for the forest management and to the people of their state or island.

There are many forest and economic health facets involved in this issue. As a representative of the Western Council, I will highlight the western concerns on this issue. However, I also want to inform the Committee that we are also concerned with the national implications for private lands and plantations that will be addressed by other witnesses today.

Congress took up the issue of energy security for our country in the 2007 Energy Bill and spent many months holding hearings and receiving testimony on the importance of this issue as well as the many materials that must be integrated into the final version of a successful bill. The Renewable Fuel Standard section of the 2007 Energy bill that was marked-up and approved by the jurisdictional committees was a solid draft and contained a workable definition for 'woody biomass.' However, a last minute change to the definition of 'renewable biomass' changed the bill in a significant manner.

The 2007 Energy Security and Independence Bill signed by the President now includes an overly-restrictive definition of *renewable biomass* that has created unfortunate consequences for the implementation of a sustainable resource management strategy consistent with the purposes of the bill itself. The revision was advocated by groups based on philosophies of old that result in broad, generalizing mandates that hinder our ability to restore forests, capture carbon from the atmosphere, provide clean air and water, and sustain healthy, vibrant communities.

According to the report, *A Strategic Assessment of Forest Biomass and Fuel Reduction Treatments in Western States,** in the west there are at least 28 million acres of forest that could benefit from reducing hazardous fuels. Implementation of any significant, sustainable effort would generate large volumes of biomass and create jobs in the West. A new way of forestry and business has emerged, one that addresses the forest health issues, wildland fire, renewable energy, as well the potential for community investment and landscape-scale restoration opportunities.

As currently codified, the definition for 'renewable biomass' stipulates the conditions wherein woody biomass on Federal and non-Federal lands may be used as a resource for the production of biofuels. The revised, and subsequently adopted, definition of 'renewable biomass' restricts the source and type of wood that can be counted towards the Renewable Fuel Standard goal in part by restricting use of woody materials from Federal lands. The definition of *renewable biomass* specifies that Federal lands, particularly the national forest system lands, are excluded from the definition of 'renewable biomass', unless they are in the immediate vicinity of communities, thereby drastically and practically eliminating the opportunity to use biomass for the production of biofuels that can count towards the law's 36 billion gallon goal for renewable fuels. Considering the vast Federal land ownership in the west, a definition that limits biomass in such a way unfairly hamstrings the west and puts us at an economic disadvantage to establish bio-based industries that can help with so many of our nation's ills. This will adversely impact significant forested ecosystems especially as our climate gets warmer, fuel loads increase and the publicly-funded budgets to undertake needed work, such as reducing hazardous fuels, shrink. This is not a sustainable scenario. We must invest in our forests and communities and not lock them up.

The definition, as currently written, is a problem because it artificially delineates what is eligible for the usage of woody biomass from many sources including both private and public lands. It unnecessarily constrains important biomass supply sources to help meet our nation's renewable energy goals and in particular, has a limiting effect on private market investment in woody biofuel solutions to our larger wildfire and forest health problems. Solutions that not only would help diminish our dependence on foreign oil, but also help address the catastrophic and mega wildfire problem which threaten nearly 170 million acres of our nation's forests. We only have to look as far as this year's fire season in northern California, as well as states outside of the West such as Texas and North Carolina, to understand what is at stake. Already over 3,300,000 acres have burned and we have spent over $800 million in suppression alone this year. And as early studies put "true fire costs," those that consider the broader range of wildfire impacts (lost economic productivity, damage to ecosystem services, utility outages, *etc.*), as high as 30:1, we cannot afford to close the door on helpful options.

And this is just the wildfire end of the problem. The out-of-control wildfires themselves have the potential to turn our forests from carbon sinks into carbon sources. Researchers from the National Center for Atmospheric Research and the University of California report that carbon emissions from fires—in some states—can exceed that which is emitted through human use of fossil fuels. A striking implication of very large wildfires is that a severe fire season lasting only 1 or 2 months can release as much carbon as the annual emissions from the entire transportation or energy sector of an individual state, based on the NCAR study.

Further, offsetting any amounts of foreign oil with domestically-supplied renewable energy has obvious foreign policy advantages that only add to the justification that we need not artificially limit our biofuel feedstocks. The current limiting definition unjustifiably adds to the cost of business, a tough notion to swallow considering the worsening budget and fiscal climate we are in. The bottom line is that we have the laws and regulations in place to guarantee we will maintain healthy and sustainable forests, even in the face of increasing demands on woody biofuel feedstocks. If we want truly sustainable and economically-feasible management of our forestland for forest health and renewable energy, the definition must be changed.

I would add that the definition creates a bureaucratic nightmare that makes any use of woody biomass cost prohibitive. Imagine trying to track woody biomass that can only come form certain lands as is currently crafted. The needed systems would not come cheap nor easy for any government entity to track. The definition also prohibits utilization of biomass from forests that are considered rare or imperiled based on global or state rankings pursuant to State Natural Heritage Program databases. This precludes the use of other information or programs that provide guidance on these forests such as state wildlife strategies, and the forest legacy program, to name a few. This is another example of some unnecessary and artificial restrictions.

We would also like to reinforce what you have heard today about the impacts this definition has on private forestlands. The definition constrains utilization of woody

biomass from plantations to "actively-managed tree plantations" on land that was cleared prior to enactment of the legislation, i.e. December 19, 2007. New plantations either established on bare land or converted from other vegetative cover after the date do not qualify as source material. This has the effect of constraining economically efficient sources of supply for a national energy initiative. Further, what would otherwise be a market incentive to reforest bare land or create and perpetuate forest cover could have the effect of encouraging conversion to non-forestland use. This issue is significant to the western U.S. as the economic constrain of any sources for a national energy initiative will hinder the long-term success of the U.S. in this market.

Continuing, the definition also precludes the utilization of biomass from "late succession" or "old growth forest," but provides no specification for what constitutes those conditions. Biomass market investment would be discouraged even though they might otherwise encourage thinning in 'older' stands to avoid or mitigate the spread of insect and disease infestation, prevent wildfire and perpetuate healthy growth. Without specifying the conditions, the current definition will create added uncertainty into the woody biofuel equation, something that will only compound the disincentives for private sector woody biofuel investment.

Our Federal lands, which make up over 40% of the land ownership in the West, are important sources of cellulosic material that can and should be used towards the goals of the 2007 Energy Bill. The current measured and thoughtful approaches to the management of and uses of woody biofuels were not taken into consideration during the discussions of materials for the RFS goals. Our belief is that the best and most successful way of approaching Federal forestland management, or all Federal land management for that matter, is to include communities and stakeholders in the process. This assures a balanced, solution oriented approach. This is not reflected in the last minute change to the renewable energy definition in the Energy Bill and does no justice in recognizing the scale of the problem we face around forest health, climate, and our dependence on foreign oil. Obviously we want to be cognizant of project scale, but a one-size-fits all approach is not the right approach. It only stifles the innovation and investment in woody biofuels that is needed and is part of a well rounded solution to these problems.

Allow me to expand upon this point with a specific example. There are many groundbreaking cross boundary collaborations that are helping to improve the health of western forests, such as that demonstrated through the implementation of the White Mountain Stewardship Contract on the Apache-Sitgreaves National Forest. Less than a decade ago, Arizona's forest-based communities near the Apache-Sitgreaves N.F. shared concerns regarding the departure of the local forest products industry and an impending threat of large, uncharacteristic wildfires. In 2002, the Rodeo-Chediski fire burned nearly ½ million acres and consumed over 400 homes forcing communities, business owners, and agency employees to move beyond the gridlock which often accompanies forest stewardship on our national forests. The end result included a long-term contracting mechanism (i.e., stewardship contract developed collaboratively by the agency and local community) which provided the necessary woody biomass supply assurance needed before investors were willing to outlay the significant capital required to produce renewable heat and/or power for local community members.

One such example is the Snowflake White Mountain Biomass Power Plant in Arizona. The plant is generating electricity through a wood-burning boiler using forest thinning (wood-waste material from the area's forest industries) and waste recycled paper fibers from an existing newsprint paper mill located adjacent to the biomass facility. At least 75 percent of the Snowflake plant's production will be generated by forest-thinning efforts occurring on U.S. forestlands that surround the communities of Arizona's White Mountains and it could not function if not for the stewardship contract mentioned above. Now this example does not tie directly to use of woody biomass for biofuel production, but a direct analogy can be made here. The private sector will not invest the tens to hundreds of millions of dollars needed to commercialize woody cellulosic biofuel production in the West knowing that the vast majority of Federal lands are off limits.

The current net growth of forest biomass—conservatively estimated at 360 million tons per year—could meet 30 percent of America's need for liquid fuels, perhaps more. Much of the material to provide this fuel would come from the small trees that should be removed to improve the health of the forests while reducing the impacts and costs of wildfire. An estimate from the USFS Forest Products Lab states that in order to improve health and decrease the risk of catastrophic wildfire, 8.4 billion dry tons of material needs to be removed from the national forests alone. If this 8.4 billion dry tons of material can not be counted towards to RFS goal the op-

portunities for energy independence in this country are being significantly limited, our forests and citizens all suffer.

We believe the Federal Government can and should be responsible land stewards and do their part to see our country on its way to energy independence. We suggest a definition of *renewable biomass* that includes materials from both private and Federal lands, gives guidance as to how those materials can meet the RFS goal and specifies how our nation's energy goals are going to be met. The demand for renewable energy and the need to protect communities and forests is a perfect fit to turn wood waste into a clean burning, renewable source of energy. We urge Congress to consider changing the definition of *renewable biomass* to allow materials from Federal lands to be 'counted' towards our Country's goals for renewable fuels in the future. Where to start? We would recommend the definition in the recently passed farm bill is a good place to look. Please let us know if you would like to follow up and pursue some solutions to this problem. We stand ready to help. Thank you for your consideration.

The CHAIRMAN. Thank you, Mr. Blazer. Mr. Burke. But before Mr. Burke begins, I would remind all witnesses to try to stay as close to the 5 minute rule as possible. Mr. Burke.

STATEMENT OF JOHN W. BURKE III, TREE FARMER, CAROLINE COUNTY, VA; PARTNER, MCGUIRE WOODS LLP, RICHMOND, VA

Mr. BURKE. Thank you. Mr. Chairman, Members of the Subcommittee, my name is John Burke. I am a private landowner in Caroline County, Virginia. I manage forestland for my family and for a number of family limited partnerships.

Our tree farms contains both planted trees, such as pine, bald cypress, green ash, and hardwood species, as well as naturally regenerated hardwood and pine. In a moment, you will see why this diversity in our tree farm is relevant to my testimony.

Today there are nearly five million family forest owners like myself, and we own nearly ⅔ of the nation's productive forestland. It is this forest resource that supplies the bulk of forest products used in wood and paper manufacturing. Today these family forest owners face many challenges in managing their forests and in planting for the succession of their forests.

I would like to share some thoughts in connection with the definition of *renewable biomass* as it appears in the RFS. In particular, the definition of *renewable biomass* in subparts ii and iv appear too narrow and too restrictive. This definition does not allow our country to reach out to the broad diverse forest resources that can sustainably provide a renewable source of biomass for the transportation fuel pipeline.

Before I get into the details, there are goals and statements which I believe that most voters will support. First, encouraging healthy forests is a good thing. Second, sustainably increasing the inventory of available, renewable biomass is a good thing. Third, increasing and strengthening markets for forest products coming from forestland owners is a good thing. I will punctuate the limitations of the definition with two examples from our woodlands.

On one of our naturally regenerated stands, that is a stand of hardwood, we conducted a pre-harvest thinning. This is a management technique used to remove inferior species, small diameter competition and trees that will not survive until harvest. In carrying out this healthy forest practice, the wood that comes from our thinning should be able to flow into the renewable biomass market. Under the definition, it appears that this thinned material may not

because these were not "planted trees" and the thinning may not be considered, under some definitions, as a pre-commercial thinning. Naturally regenerated stands are a very important and a very large component of the makeup of America's forest resources.

Further the wide geographic availability of naturally regenerated forests means that they usually will be part of a local supply, thereby reducing transportation costs for this very important cellulosic feedstock. As you can see, this important component of America's forests and the good management techniques needed for these naturally regenerated forests could be ignored by the existing definition and therefore ineligible to the RFS.

A second example from our woodlands: In one of our stands, it consists of both naturally regenerated pine, loblolly pine, and planted pine. This stand was established after a harvest that my father conducted. Following the harvest we did site prep and planted trees, pine trees, on most of the stand. A unique feature was the presence of naturally regenerating loblolly pines. We did not plant in that area but allowed these to naturally regenerate and to develop along with the planted pines.

At the sixteenth year of the life of this stand, we mechanically thinned the entire stand to remove the weaker trees and to allow crop trees better spacing, that is more access to water, nutrients, and sunlight. These practices are consistent with healthy forest management. Under the present definition, however, it is not clear whether and to what extent materials from our thinning would be considered renewable biomass. This definition may either exclude the materials we thinned from the stand from the renewable energy pipeline, or in the alternative require a very difficult identification and sorting process to separate out those trees that were thinned from planted trees *versus* those trees that were thinned from naturally regenerated trees.

As you can see from this fact pattern, the definition appears unnecessarily limited and could require complex and probably unworkable tracking mechanisms.

In sum, I would urge that the definition of *renewable biomass* under the Energy Independence and Security Act of 2007 be broadened and expanded by new legislation amending this title. In the alternative, it is my request that these concerns be taken into consideration as part of the rule making process so as to broaden and make more inclusive the definition of *renewable biomass*. Thank you.

[The prepared statement of Mr. Burke follows:]

PREPARED STATEMENT OF JOHN W. BURKE III, TREE FARMER, CAROLINE COUNTY, VA; PARTNER, MCGUIRE WOODS LLP, RICHMOND, VA

Thank you for this opportunity to testify regarding the role of America's forest resources in connection with the Renewable Fuel Standard under the Energy Independence and Security Act of 2007.

Mr. Chairman and other Members of the House Committee on Agriculture's Subcommittee on Conservation, Credit, Energy and Research, my name is John Burke. I am a private landowner in Caroline County, Virginia. I manage forestland that my wife and I own and also manage forestland for a number of family limited partnerships. In addition, I practice law in Richmond, Virginia and am active in forestry related organizations at the state and national level. Our tree farm contains planted trees, such as pine, bald cypress, green ash and other hardwood species, as well as

naturally regenerated pine and hardwood. In a moment you will see why this diversity in our woodlands is relevant to my testimony.

The wise management of forest resources is critically important to the health of a forest and to many benefits that the public enjoys, including habitat for various wildlife species, protection of water quality through management of critical watersheds, and the enhancement of air quality and green space around our cities and urban areas. Stewardship and management by forest landowners for future sustainability cannot, however, occur in a vacuum. It must occur in the context of real world markets and the challenges and risks facing family forest owners.

Family forest owners currently face difficult economic times and the challenging task of maintaining the health of their forests. Today there are nearly five million family forest owners in the United States who own nearly ⅔ of the nation's productive forestland. It is this forest resource that supplies the bulk of the forest products used for wood and paper manufacturing. Today this group of landowners faces many challenges in managing their forests and planning for the succession of their forests to future generations.

Now that you know my interests and bias, I would like to share some thoughts in connection with the definition of *renewable biomass* as it appears in the Renewable Fuel Standard of the Energy Independence and Security Act of 2007. Allow me to direct your particular attention to two subparts contained in the definition of *renewable biomass*. These are subparts (ii) and (iv). In sum, the definition of *renewable biomass* appears too narrow and restrictive. It does not allow us to reach out to the broad, diverse forest resources that can sustainably provide a renewable source of biomass for transportation fuels. As we drill down on the particulars of this definition, I will share with you those areas where I believe the definition contains unnecessary and inappropriate limitations.

There are three goals or statements which I believe most of America's voters will support:

(1) Encouraging healthy forests is a good thing;

(2) Sustainably increasing the inventory of available renewable biomass is a good thing; and

(3) Increasing and strengthening markets for the forest products coming from land of forest owners is a good thing.

We will now examine whether, and to what extent, the definition of *renewable biomass* furthers these goals and, equally important, the goals of the Energy Independence and Security Act of 2007.

Subparagraph (ii) of the definition of *renewable biomass* contains a number of unnecessary restrictions or limitations. For example, the requirement of "planted trees" and "tree plantations" could exclude from the definition of *renewable biomass* materials from naturally regenerated forests. Further, this definition's limitation of "land cleared at any time prior to the enactment of this sentence" is an unnecessary timing limitation, apparently intended to impact what some view as inappropriate land conversion.

I will punctuate the impact of the "planted trees" limitation with two examples from our woodlands. On one of our naturally regenerated hardwood stands, we conducted a pre-harvest thinning. This is a management technique used to remove inferior species, small diameter competition and trees that will not survive until the harvest. This technique improves the health of the forest and improves the genetic makeup of the under story. In this way, when the future harvest occurs, the resulting next stand of hardwood trees will have larger trees, of better quality with a higher percentage of the desired tree species. In carrying out this healthy forest practice, the wood that comes from our pre-harvest thinning should be able to flow into the renewable biomass market. Under this definition, it appears that this thinned material would not, because these were not "planted trees". Naturally regenerated stands are a very large and important component of the overall makeup of America's forest resource. Further, the wide geographic availability of naturally regenerated forests means that they will usually be part of a local supply, thereby reducing transportation costs for this cellulosic feedstock. On our tree farm, we try to maintain a balance between naturally regenerated stands and planted stands. As you can see, this important component of America's forests and the good management techniques needed for these naturally regenerated forests could be ignored by the existing definition of *renewable biomass* and therefore not eligible for inclusion in the Fuel Standard.

Further, it appears that the definition is intended to capture only material from planted tree plantations. Another example from our family forest will highlight the problem with this limitation. One of our pine stands consists of approximately 100

acres of loblolly pine. This stand was established following a harvest that my father conducted. After the harvest, we did site preparation through a control burn, planted pines on most of the stand (more on that later) and then sprayed the stand during the second year of its life to control competition. One unique feature of this stand, however, was the presence of an area of approximately 30 acres where loblolly pines were naturally regenerating. My father did not plant this area, but allowed the naturally regenerated pines to develop along with the other planted pines on the rest of the stand. Over a 3 year period we conducted, by hand, an initial thinning on that area of the stand that was naturally regenerated because these trees were too densely populated. Then, at approximately the 16th year of this stand's life we had the entire stand mechanically thinned to remove the weaker trees and to allow the crop trees better spacing (more access to water, nutrients and sunlight) so as to be more resistant to insect and disease attack, and to grow bigger and better for future timber harvesting and the other collateral benefits of a healthy forest. All of these practices are consistent with healthy forest management. Under the present definition, however, it is not clear whether and to what extent material from this later thinning would be considered renewable biomass. In other words, the pines which we allowed to regenerate naturally may not be considered "planted trees". So this definition may either (1) exclude the materials we thinned from this stand from the renewable energy pipeline or, in the alternative, (2) require a very difficult identification and sorting process to separate out those trees which were thinned from planted trees *versus* those trees which were thinned from naturally regenerated trees. As you can see from this fact pattern, the definition is unnecessarily limited and could require complex and probably unworkable tracking mechanisms.

An additional concern arises as I study the definition and the limitations contained in subparagraph (ii). In particular, a hyper-technical reading could exclude from the renewable biomass pipeline even those trees thinned from a planted stand, because in many instances the trees thinned are not "planted trees", but naturally regenerated competition growing up in the planted stand. It is my assumption and my hope that this is not the case and I am offering this to you so that it will be part of the legislative history as rules are written and as courts attempt to adjudicate what these words mean.

The timing limitation also contained in subparagraph (ii) requires that for wood products to qualify they must come from "land cleared at any time prior to the enactment of this sentence." This "prior to" requirement unnecessarily restricts the inventory of available renewable biomass. If the goal is to control land conversion, then it should be addressed directly at the state or local level and not buried in this definition. Our free market has worked quite well in the past and we should continue to allow it to work in connection with a forest landowner's decision with regard to his or her land and what types of trees or crops will be grown there.

Subparagraph (iv) of the definition of *renewable biomass* also includes unnecessary limitations on the inventory of biomass available to the renewable energy pipeline. In particular, it appears to be limited to only "slash and pre-commercial thinnings" and it has an exclusion based on "old growth forests" or "late successional forests". First, there is no scientific basis for limiting the feedstocks that qualify for renewable energy to only "pre-commercial thinnings" as opposed to any type of thinning. A landowner and his or her consulting forester should be allowed to make the decision whether, based on the health of the forest, landowner objectives and market conditions, to allow materials from any thinning to flow into the renewable energy pipeline. Further, the concepts of "old growth forests" and "late successional forests" are hot buttons in forestry. Many people disagree about the validity and meaning of these terms. To exclude products coming from these types of areas creates its own problems. First, there are mechanisms at certain state and local levels to protect these types of rare stands where, on the unique facts at hand, a particular type of tree may be very difficult to reestablish if it is lost. This legislation is not the place for that activity. Second, sorting out which thinnings come from one type of stand *versus* another will create an implementation headache that is likely to discourage the availability of renewable biomass inventory.

Limitations such as "tree plantations" and "old growth forests" reveal the footprints of special interests. This, in and of itself is not necessarily bad; however, the limitations contained in the definition of *renewable biomass* are counterproductive to the goals of the legislation and counterproductive to the three goals discussed above. Further, these limitations will likely lead to disputes and unnecessary complexities as the regulations are written to implement this law. Moreover, these limitations will lead to disputes and complexities as the law and the regulations are implemented on the ground, thereby reducing the available inventory of renewable biomass. Further, litigation may result as parties with diverse interests try to under-

stand what these unclear words mean. Such litigation will work its way through the trial and appellate courts of our Federal system. At some point, we will look back and say, "This law was a great idea. Why didn't it work?" The definition of *renewable biomass* needs to be simplified and streamlined and the limitations and restrictions need to be removed from it so that the working definition of *renewable biomass* is not the reason for our failure to accomplish the goals of this legislation, and other goals important to the health of our forests.

Some may argue that a broad definition of *renewable biomass* may overlap with existing markets for pulpwood and wood chips and that, in these hard economic times, we should not sacrifice one market for another. First, I concur that these are difficult economic times and that family forest owners feel the stress of these difficult economic conditions. Family forest owners are faced with tight and ever-shrinking markets for the wood that we choose to sell. No one—least of all me—would want simply to gain one market for my low-value wood and lose another at the same time. The answer, however, is not to limit the definition of *renewable biomass* for biofuels, but rather to broaden the definition and to use the "biorefinery bridge." In particular, our existing pulp and paper industry has a world class procurement system and it is in the best position of all of us to become a major player in the production of fuel from renewable biomass. This industry's mills are almost always close to the wood and their manufacturing processes already include systems that could be adapted for biofuel production. So it is time to broaden, not to limit, the definition of *renewable biomass* for biofuels.

The overall benefits of the Renewable Fuel Standard under the Energy Independence and Security Act of 2007 dovetail with the benefits available under the energy title of the farm bill. However, these two provisions, meant to be bookends to encourage renewable energy, do not work well together. The definition of *renewable biomass* contained in the farm bill is broad and will permit many projects; however, the definition of *renewable biomass* in the Renewable Fuel Standard appears narrow and will cause a bottleneck as those products try to find their way to market.

In conclusion, the definition of *renewable biomass*, as contained in the Renewable Fuel Standard under the Energy Independence and Security Act of 2007 is too limited and exclusionary. First, this definition could exclude from the renewable energy fuel pipeline many appropriate sources of biomass. These limitations are, therefore, counterproductive to the goals of the legislation. In particular, much appropriate biomass from naturally regenerated family forests may not be available as a feedstock to qualified renewable energy fuels. Second, the definition fails to encourage healthy forest practices. For example, the thinning of naturally regenerated stands is, in many instances, a proper forest management tool and materials from these thinnings should qualify as an input to the renewable energy pipeline. Third, the limitations appear counterproductive to providing more and stronger markets for the forest products coming from the land of family forest owners.

I urge that the definition of *renewable biomass* under the Energy Independence and Security Act of 2007 be broadened and expanded by new legislation amending this title. In the alternative, it is my request that these concerns be taken into consideration as part of the rule-making process, so as to broaden, and to make more inclusive, the definition of *renewable biomass*.

The CHAIRMAN. Thank you, Mr. Burke. Mr. Grant.

STATEMENT OF DUANE GRANT, PARTNER AND GENERAL MANAGER, GRANT 4–D FARMS; GENERAL MANAGER, FALL RIVER FARMS; VICE CHAIRMAN OF THE BOARD, SNAKE RIVER SUGAR COMPANY, RUPERT, ID

Mr. GRANT. Chairman Holden, Ranking Member Lucas, my name is Duane Grant, and I am a farmer from Rupert, Idaho. I farm wheat, barley, corn, potatoes, and sugar beets. It may also interest the Committee to know that I am Vice Chair of the group known as Snake River Ethanol, a cooperative in Idaho that is looking at building a destination corn-based ethanol facility. I was also Chairman of the Straw Value Add Committee, a consortium of farmers in Idaho who worked diligently with Iogen to site a cellulosic refinery in southern Idaho, which I will touch on further in my testimony.

I appreciate the opportunity to testify here today on the extended RFS included as part of the EISA and associated issues of interest to agricultural producers.

Clearly, passage of the EISA puts us on a path where renewable fuels will make up an ever greater share of our liquid transportation requirements. Let us talk for just a minute about biomass production in context of agriculture.

I think that some felt that with the passage of the EISA and other biofuels related legislation, farmers would be racing to plant switchgrass and other dedicated energy crops from fence row to fence row.

But despite operating in a very risky environment, farmers are generally a very risk-adverse group. You are not going to see us rushing to plant any new crop that has never been grown before on a commercial scale in this country or an other country for that matter, which has no direct market already established. Obviously then without adequate feedstock growing in the field, a refinery won't locate to a given location, and without a refinery to purchase feedstock, growers will continue to be reluctant to grow it, leading us to the proverbial chicken and egg problem.

This Committee and the Congress recognized this dilemma in the recently enacted 2008 Farm Bill's Energy Title and with the establishment of the Biomass Crop Assistance Program, I encourage you to urge quick implementation of this program.

Let us talk for a moment about sustainability and what that means in this context, how central to many debates in agriculture these days is the idea of sustainability. Certainly this means different things to different people, but I would suggest the following as a working definition. "Sustainability" means managing the use, development, and protection of our natural, social, and environmental resources in a way and at a rate that enables people to meet their current needs without compromising the ability of future generations to meet their needs. So the question is not whether or not we should produce biomass or any other agricultural crop for that matter in a sustainable manner. The question becomes how to find a balance between these often competing values.

I have personal experience in an effort where community came together and balanced the economic, environmental, and social interests for the greater good. The Iogen Corporation, a Canadian cellulosic ethanol manufacturer, had a interest in building a commercial-sized cellulosic refinery in southern Idaho. However, unfortunately due to delays in getting a loan guarantee program established at the Department of Energy, the project is currently on hold. But the process that those of us in the community have gone through to secure feedstock for the facility is instructive.

The proposed Iogen facility would utilize primarily wheat and barley straw for conversion to cellulosic ethanol. We surveyed growers in the region and found that we were able to obtain between 600,000 and 800,000 tons of wheat and barley straw under preproduction pre-refinery construction contracts. Those were contractual commitments the growers made. We determined that we could remove this tonnage and still retain enough residue on the ground to ensure the maintenance of organic matter in the soil so as to maintain soil productivity. All of this was accomplished in as-

sociation with local community interests and local environmental interests.

The definition then, moving to the next topic of what actually is *renewable biomass*, is of interest to us as well. Of course, as we have heard often today as provided in the EISA, *renewable biomass* is defined as "planted crops and crop residue harvested from agricultural land cleared or cultivated at any time prior to the enactment of this sentence that is either actively managed, fallow, or non-forested."

The energy component of the farm bill contains a definition of *renewable biomass* that is in contradiction to this definition and is not nearly as restrictive as the definition contained in the EISA. And so while I certainly appreciate this Committee's interest in providing farmers with the best economic opportunity for growing biomass on any and all of the land they might have, it might be important to remember the history of farming and cultivation in this country when considering this definition.

Farming and cultivation have occurred in this country since well before it became a country but were revolutionized when Mr. John Deere invented the first commercially successful self-scouring steel plow in 1837.

Then using tools like the steel plow and its predecessors, horse- and mule-drawn implements, settlers opened vast acreages wherever they could plow. Over time, much of the less desirable land was subsequently removed from intensive agriculture production and reverted to livestock use, native vegetations, or in other ways became fallow. I believe that, as markets of biomass or feedstocks develops, farmers may find it ideal to concentrate on opportunities for growing biomass crops on land which is marginal for high input cost, low crop production, but could be ideally suited for dedicated perennial biomass crops.

Let us touch just briefly on the lifecycle issues and greenhouse gas emissions as it relates to this topic. The RFS also required EPA Administrator to take into consideration lifecycle greenhouse gas emissions including all stages of fuel and feedstock production. I and my fellow agricultural producers have questions about how this requirement will be executed and what it will mean for our renewable fuel feedstock and food crop production. Proper implementation of this key component of the RFS is critical to the successful development of the cellulosic industry.

In conclusion, I would like to reiterate my personal support for the Renewable Fuel Standard and increased production of renewable fuels, especially cellulosic ethanol. The RFS is essential to the continued growth of this industry. I would just emphasize that point, and I urge you to oppose, in the strongest possible terms, any effort to reduce its influence.

Thank you, Mr. Chairman and Ranking Member, and I will be happy to answer questions at the appropriate time.

[The prepared statement of Mr. Grant follows:]

PREPARED STATEMENT OF DUANE GRANT, PARTNER AND GENERAL MANAGER, GRANT 4–D FARMS; GENERAL MANAGER, FALL RIVER FARMS; VICE CHAIRMAN OF THE BOARD, SNAKE RIVER SUGAR COMPANY, RUPERT, ID

Chairman Holden, Ranking Member Lucas and Members of the Committee, my name is Duane Grant. I farm 18,000 acres of wheat, barley, corn, potatoes and sugar beets near Rupert, Idaho.

I appreciate the opportunity to testify here today on the expanded Renewable Fuel Standard (RFS) included as part of the Energy Independence and Security Act (EISA) and associated issues of interest to agricultural producers.

Passage of the EISA has clearly put us on a path for renewable fuels to make up an ever greater share of our liquid transportation fuel requirements. The extended and expanded the RFS now calls for the blending into our fuel supply 9 billion gallons of renewable fuel in 2008, increasing to 36 billion gallons of renewable fuels by 2022. Of this 36 billion gallon requirement, 21 billion gallons must be advanced biofuels, including cellulosic biofuels and biomass-based diesel.

Biomass Production

I think some felt that with passage of EISA and other biofuels-related legislation, farmers would be racing to plant switchgrass or other dedicated energy crops from fence row to fence row. Indeed, it is our hope that these non-food crops eventually provide significant feedstock for second-generation ethanol, along with agricultural residue like wheat straw.

However, despite operating in a very risky business, farmers are generally a very risk-averse group. You're not going to see them rushing to plant any new crop that's never been grown on a commercial scale before in this country and has no direct market already established. Farmers like to work with what they know and while growing switchgrass or other dedicated energy crops may not be rocket science, it may well be soil science or some other cultivation issue that could crop up, so to speak, on a commercial scale. Current high prices for wheat and corn also incentivize producers to stick with what they know.

This, of course, is a short description of the much-touted chicken and egg problem. Without adequate feedstock growing in the field, a refinery won't locate in a given location, and without a refinery to purchase the feedstock, growers will be reluctant to grow it.

I believe this Committee and the Congress recognized this dilemma in the recently enacted 2008 Farm Bill's energy title with the establishment of the Biomass Crop Assistance Program. This program is designed to provide incentives to farmers and foresters to grow bioenergy crops in a sustainable manner in an attempt to address the issue of who goes first in the development of cellulosic ethanol. This program also provides an incentive for farmers to harvest, store and transport biomass to bioenergy facilities. I encourage you to urge quick implementation of this program.

Sustainability

Central to many debates in agriculture these days is the idea of sustainability. Certainly this means different things to different people, but I would suggest the following as a working definition: sustainability means managing the use, development and protection of our natural social and environmental resources in a way and at a rate that enables people to meet their current needs without compromising the ability of future generations to meet their needs, Utilizing this definition requires that we recognize the interdependence between our economic, environmental and community needs.

So the question is not whether we should produce biomass—or any other agricultural crop—in a sustainable manner, the question becomes how to find a balance between these often competing values. Imagine three overlapping circles—one representing our economic needs, one representing our environmental needs and one representing our social or community needs. The area where the three circles overlap is the area of sustainability—the area through which run all the elements of a good quality of life: a healthy, functioning natural environment; a strong economy with jobs and job security; and safe, secure communities where people have a sense of belonging and purpose and a commitment to each other. These elements—these threads which together weave the fabric of sustainability—are things we hold in common.

Some may say that today these threads are beginning to fray and unravel in ways both large and small. This need not be the case. I have personal experience in an effort where the community came together and balanced the economic, environment and social interests for the greater good. The Iogen Corporation, a Canadian cellulosic ethanol manufacturer. has an interest in building a commercial-sized cel-

lulosic refinery in southwest Idaho. Due to delays in getting a loan guarantee program established at the Department of Energy, the project is currently on hold, but the process those of us in our community have gone through to secure feedstock for the facility is instructive.

The proposed Iogen facility would utilize primarily wheat and barley straw for conversion to cellulosic ethanol. We surveyed growers in the region and found that we were able to obtain somewhere between 600,000 to 800,000 tons of wheat and barley straw under pre-production contracts. We determined that we could remove this tonnage and still retain enough residue on the ground to ensure continued organic matter in the soil to maintain soil productivity. From that standpoint, we believed that we could continue to provide feedstock to a facility that will consume 1,400 to 2,000 tons per day of this agriculture residue in a sustainable manner. All of this was accomplished in association with local community interests and local environmental interests.

By the way, when finally built, this facility will produce between 40 to 60 million gallons of cellulosic ethanol per year and provide 90 full time jobs in addition to 500 construction jobs for 2 years, 100 feedstock collecting jobs and 450 spin-off jobs. So we hit all three of my elements of sustainability—economic, environment and community needs.

Definition of Renewable Biomass

I understand that the Committee has some concerns over how *renewable biomass* is defined in EISA and the general debate over the sustainability of renewable biomass production.

As provided in the EISA, *renewable biomass* is defined as, "Planted crops and crop residue harvested from agricultural land cleared or cultivated at any time prior to the enactment of this sentence that is either actively managed or fallow, and nonforested."

While I certainly appreciate the Committees interest in providing farmers with the best economic opportunity for growing biomass on any and all land they might have, it may be important to remember the history of farming and cultivation in this country when considering this definition. Farming and cultivation have occurred in this country since well before it became a country, but were revolutionized when John Deere invented the first commercially successful, self-scouring steel plow in 1837.

Using tools like the steel plow and its predecessors, horse- or mule-drawn implements, settlers opened vast acreages wherever they could plow. Over time, much of the less desirable land was subsequently removed from intensive agriculture and has reverted to livestock, native vegetation or in other ways become fallow. I believe that, as the market for biomass feedstock develops, farmers may find it ideal to concentrate on opportunities for growing biomass crops on land which is marginal for high input cost row crops but often ideally suited for dedicated perennial biomass crops.

Having said this, I find it interesting to note that the definition of *renewable biomass* contained in the recently enacted energy title of the farm bill seems to contain no such restriction to prior cleared or cultivated land. Perhaps USDA should be encouraged to work with the Environmental Protection Agency through Memorandum of Understanding or some type of joint rulemaking to harmonize the potentially competing definitions.

Lifecycle Greenhouse Gas Emissions

The RFS also requires the EPA Administrator to take into consideration lifecycle greenhouse gas emissions including all stages of fuel and feedstock production. I and my fellow agricultural producers have questions about how this requirement will be executed and what it will mean for our renewable fuels feedstock and food crop production. For instance, how will these determinations be made at the farm gate level? Will lifecycle GHGs also be considered for non-feedstock production? The answers to these questions have serious implication for crop production in this country, and we encourage you to continue to seek information and provide guidance as appropriate to the EPA as they undertake this process.

And when it comes to agricultural residues, am I now going to be somehow penalized for growing a crop of wheat or barley? And if I decide to not sell my straw to Iogen, am I then off the hook?

Conclusion

In conclusion, I would like to reiterate my personal support for the Renewable Fuel Standard and increased production of renewable fuels, especially cellulosic ethanol. We are already seeing positive effects from this homegrown fuel in an increased fuel supply that is keeping gas prices lower than they would have ordinarily

been if we are reliant only on oil. Expansion of this industry has provided and will continue to provide important economic advantages to rural communities, in many cases revitalizing areas through value-added production. The RFS is essential to the continued growth of this industry, and I urge you to oppose in the strongest possible terms any effort to reduce its influence.

This concludes my testimony, and I thank you again for the opportunity to be here today. I'm happy to answer any questions you may have.

The CHAIRMAN. Thank you, Mr. Grant. Mr. Cassman.

STATEMENT OF KENNETH G. CASSMAN, PH.D., DIRECTOR, NEBRASKA CENTER FOR ENERGY SCIENCES RESEARCH; PROFESSOR, DEPARTMENT OF AGRONOMY AND HORTICULTURE, UNIVERSITY OF NEBRASKA-LINCOLN, LINCOLN, NE

Dr. CASSMAN. Thank you, Mr. Chairman. It is indeed a privilege to be here today. I have a PowerPoint presentation, and detailed testimony is given in the back of that handout that is available on site.

We are going to pick up where Mr. Grant left off talking about the greenhouse gas emission standards in the 2007 EISA. And the proposal I would like to put before this Committee today, Subcommittee today, is that this is the first climate change legislation that will have teeth, and those teeth will first be used on agriculture as the guinea pig. And I think this is something that, unless we recognize it explicitly up front, we will be very surprised in the outcome.

You have heard a number of people talk about what those standards are briefly. Starch ethanol, cellulose ethanol, advanced ethanol all have standards that they must meet with regards to reduction of greenhouse gases both direct and indirect effects. They grandfather existing plants for starch ethanol, but there will be an effect through the imposition of low-carbon fuel standards at the state level such that if corn ethanol is deemed not to meet those standards, blenders in California, for instance, would have to buy higher cost, low-carbon intensity fuels to offset the use of corn ethanol blending in California. This would add cost to the use of corn ethanol in markets like California.

So I want to make the case that it is critically important to get corn ethanol right. We will have plenty of time to work on the greenhouse gas standards for cellulosic and other types of second generation ethanol, but it will be immediately used on corn ethanol. So the focus when EPA goes forward must be on corn ethanol, getting that right, because it will effect how low carbon fuel standards are implemented in the states, not just California. The Midwest is looking at this, as well as the Northeast.

It is going to effect the role of corn and agriculture in general in greenhouse gas legislation that is coming later perhaps in terms of offsets and credit markets. It will effect loans and risk assessment of different projects, and it greatly effects public perception about the role of agriculture in contributing to climate change.

Now, it is important to use the best science and data. I would like to make the case here. More than 60 percent of all corn ethanol produced today is coming from ethanol plants that have been built since 2005. By next year, 75 percent come from plants built from 2005. Unfortunately, the way things are going, older data

from before the massive investment in modern ethanol plants will be used for corn ethanol.

And I just show these data here that we are finding that recent data shows that energy use in the ethanol plant itself is way down from what it was in older studies. For instance, the data used in the GREET model is being used by EPA and in California. And energy use in the ethanol plant is 30 to 35 percent of total energy use. We are finding is it 25 to 30 percent less than the data they are using, and this is actually data measured on the existing plants.

The bottom line is you end up with, by our estimation using the BESS model, 54 percent reduction in greenhouse gases compared to what is being estimated currently by GREET of 24 percent. If you add any indirect land use change carbon cost to the GREET estimate, corn ethanol will not make it in the California market. And it is likely to be worse in gasoline.

So we have to then look ahead. How can we avoid getting in this situation with second generation biofuels? And the answer is we need to invest in the kind of research that achieves scientific consensus well before the large-scale commercialization. And this was a mistake made with corn ethanol. We are only guessing now rather than having real data from production-scale field research.

And the rest of my testimony, which I won't have a lot of time to go through, provides information about the kind of research that is required to ensure that by the time we are ready to have large-scale commercialization and investment in second-generation biofuels, we have the data. Farmers can be assured, investors can be assured that there won't be second looks at the system and changing the numbers halfway through the game.

This gives you an example of what research like this looks like. It has to be done at a production scale because the scale at which you conduct the research effects the answer you get. You do it in small scale research blocks, you get one answer. You do the same work at a large production scale, you get a different answer.

That is largely because of the heterogeneity in fields. You get the small plots. And fortunately we have geostatistics, new methods to take account of this. We have new, exciting research methods to do scaling from single plants, plant communities and landscapes and regions.

So in conclusion, my goal is two things. One to ensure we get the greenhouse gas emissions science and data right for corn ethanol. My fear is we are not doing it; although we do have tools that can do it. And second to invest properly, and I don't see it in current USDA research legislation or in DOE legislation, that we invest properly to ensure that we have the science and data to achieve a consensus on the contributions of second generation biofuels to greenhouse gas emissions. Thank you, Mr. Chairman.

[The prepared statement of Dr. Cassman follows:]

PREPARED STATEMENT OF KENNETH G. CASSMAN, PH.D., DIRECTOR, NEBRASKA CENTER FOR ENERGY SCIENCES RESEARCH; PROFESSOR, DEPARTMENT OF AGRONOMY AND HORTICULTURE, UNIVERSITY OF NEBRASKA-LINCOLN, LINCOLN, NE

Mr. Chairman and Members of the Subcommittee, I appreciate the opportunity to testify on the state of current knowledge and knowledge gaps affecting implementation of lifecycle assessment (LCA) protocols to estimate greenhouse gas emissions

(GHG) by different types of biofuels as required by the Energy Independence and Security Act of 2007 (EISA). I believe that development of these protocols will have a large impact on the economic viability of both the biofuel industry and the broader farm economy.

I am Dr. Kenneth G. Cassman, Director of the Nebraska Center for Energy Sciences Research, a position I have held since the Center was created in 2006. Previously I worked as a research agronomist in the Amazon Basin of Brazil, Egypt's Nile Valley and at the International Rice Research Institute in the Philippines. My academic appointments include 7 years on the faculty at the University of California—Davis, and 13 years at the University of Nebraska where I served as Head of the Department of Agronomy from 1996–2004. My research, teaching and extension efforts have focused on ensuring local and global food security while conserving natural resources and protecting environmental quality. My current research focuses on the environmental impact of biofuel systems, including development of lifecycle assessment tools for estimating the GHG emissions of corn grain-ethanol, and cellulosic ethanol produced from corn stover or switchgrass.

I come from a state where the long-term viability of the biofuel industry is a major driver of economic development, especially in rural Nebraska. In fact it is now one of the largest industries in the state, and Nebraska ranks second nationally in ethanol production. Nebraska also has an emerging biodiesel industry, and the Abengoa company is developing a pilot plant for cellulosic ethanol production in York, NE—a project partially supported by the Department of Energy. Like many regions of the country, Nebraska's entrepreneurs are looking at advanced cellulosic biofuels and considering their potential.

My testimony will focus on three topics:

(1) The importance of using the best science and most recent data for establishing the methods and standards for GHG emissions reductions of corn—grain ethanol systems compared to gasoline in complying with the 2007 EISA, and how the lack of scientific consensus about this issue can be addressed;

(2) The need to achieve a scientific consensus on the environmental impact and GHG emissions of *second-generation biofuels,* such as cellulosic biofuels, before they are widely commercialized; and

(3) The science required to ensure that such a consensus is achieved for developing the lifecycle assessment methods and standards for second generation biofuels.

As you are well aware, EISA requires that:

- EPA establish methods and standards for assessing lifecycle GHG emissions for different types of biofuels with the comparable petroleum-based fuel as the basis for comparison;
- Starch-ethanol plants, such as those that use corn grain, that came into production after 2007 must reduce GHG emissions by 20% (existing plants are exempted);
- Cellulosic biofuels must reduce GHG emissions by 60%; and
- Advanced biofuels must reduce GHG emissions by 50%.

Regulations for GHG emissions reductions are also part of the California *Low Carbon Fuel Standards* (LCFS), which will play an important role in determining the value of different biofuels in marketplace. Unlike the 2007 EISA, there are no exemptions for existing biofuel plants under the California LCFS. In addition to California, a number of others states are developing or considering the development of LCFS. Because it is important that EPA biofuel emissions assessment protocols be consistent with state-level LCFS, EPA has an opportunity to play a leadership role to ensure that the best science and most recent data are incorporated into these standards.

There may also be opportunities for the biofuel industry to monetize GHG emissions reductions if they can be properly documented and certified for emissions trading markets both in the U.S. and globally. For example, several climate change bills under development include cap-and-trade provisions for GHG emissions. Developing scientifically robust, accurate, and user-friendly LCA assessment tools provide the foundation for inclusion of biofuels in a cap-and-trade emissions market.

As we embark on the effort to develop LCA methods for estimating GHG emissions from different biofuels, it is imperative that the regulatory process "*get corn ethanol right*" for three reasons. **First**, corn grain-ethanol (hereafter called corn ethanol) is the only biofuel that will be directly affected by the EPA guidelines as soon as they are developed because it is the only biofuel that is available and used on a large scale. Present annual corn ethanol production capacity is approaching 9 bil-

lion gallons per year (bgy), and it will likely reach more than 12 bgy by end of 2009. In contrast, the 2007 EISA does not mandate use of more than 1 bgy of cellulosic ethanol until after 2013. Hence, EPA's guidelines for GHG emissions from cellulosic biofuels may be developed and refined over the next 4 years before cellulosic ethanol is commercialized on a large scale. **Second**, EPA's efforts to determine the degree to which corn ethanol reduces GHG emissions compared to gasoline may have a large influence on the development and implementation of state-level LCFS. In fact, if corn-ethanol is determined by EPA and/or state regulators to emit more GHG than gasoline, then corn-ethanol would fetch a lower price in LCFS markets as blenders must buy higher-priced low carbon-intensity fuels to offset the use of corn-ethanol. If this occurs, it would likely have a devastating impact on the U.S. corn ethanol industry and the farm economy. Third, the values set by EPA for GHG emissions of corn ethanol compared to gasoline will influence public opinion regarding the whether corn ethanol, and perhaps renewable fuels in general, are a positive or negative factor in addressing climate change concerns. It is not enough to say "we have a process to adjust the number later," although EPA is required to do that as well. History tells us that public opinion will latch onto the first standard issued, and if the number is inaccurate, the public may lose trust in the LCA process itself and withdraw their support for further development of renewable biofuels because of concerns about environmental impact.

Given this situation, we must learn from our experience with corn ethanol, where large-scale commercial production is well ahead of the science and knowledge required to develop accurate regulations regarding impact on GHG emissions. Instead, we must develop the scientific methods and forge a scientific consensus BEFORE producers start growing "second generation" biofuel crops on a large scale. Indeed, it may be difficult to entice producers to grow a second generation biofuel crop feedstock such as switchgrass if there is a risk that lifecycle GHG emission reduction levels will be changed at a later date such that they fall below the required 2007 EISA thresholds. What investor will invest many millions of dollars in a cellulosic refinery without knowing this information with a high degree of certainty?

I believe our experience at the University of Nebraska-Lincoln to develop user-friendly lifecycle assessment software for estimating GHG emissions of corn-ethanol systems is instructive in this regard. Our goal was to bring together an interdisciplinary group of scientists to use the best available science and most recent data to ensure that the model accurately estimated the performance of corn-ethanol systems as they currently function. Our model is called the Biofuel Energy Systems Simulator (*BESS Model*), and it estimates the lifecycle net energy yield and GHG emissions of corn ethanol. It has the capability to simulate ethanol facilities at a state or regional levels, and also for an individual biorefinery, including: crop production, the ethanol biorefinery, and the cattle feedlot for feeding co-product distiller's grains. Systems that include an anaerobic digestion unit as part of a closed-loop corn-ethanol biorefinery can also be simulated. The BESS model is available to the public for download at *www.bess.unl.edu.*

The BESS model performs three types of lifecycle analysis:

- Energy analysis—lifecycle net energy yield & efficiency;
- GHG emissions analysis—net carbon dioxide (CO_2) and trace greenhouse gases (CH_4, N_2O), and global warming potential (GWP); and
- Resource Requirements—crop production area and total amounts of grain, water, fossil fuels (petroleum, natural gas, and coal) used in the production lifecycle.

It is my understanding that EPA has been relying on a different model called the Greenhouse gases, Regulated Emissions and Energy use in Transportation (GREET) model from the U.S. Department of Energy's (DOE) Argonne National Laboratory. Unlike the BESS model which can only simulate corn ethanol systems, the GREET model has the capacity to evaluate and compare the environmental impacts of a wide range of renewable and conventional transportation fuels and motor vehicle fleets. While having the capacity to evaluate a wide range of different biofuels, as well as petroleum-based fuels, is critical to the EPA effort to meet the 2007 EISA requirements for establishing GHG emissions protocols, we believe the GREET estimates for corn-ethanol do not reflect the current status of the corn-ethanol industry.

In fact, there are large differences in estimates of GHG emissions from direct effects of corn-ethanol production obtained from the BESS and the GREET models. While the BESS model estimates an emissions reduction of 54% reduction compared to gasoline, the GREET model estimates a 24% reduction, and this lower value is currently being proposed as the standard for implementing the California LCFS. It is our understanding that EPA is also basing their estimates of direct-effect GHG

emissions for corn ethanol on the GREET model. Because an additional amount of GHG emissions is likely to be added due to land-use change, the GREET estimate will therefore result in failure of corn ethanol to meet the statutory 20% GHG emissions reduction standard of the 2007 EISA. The primary reasons for the greater GHG emissions reduction estimated by the BESS model is because it uses more recent data for crop production, biorefinery energy efficiency, and co-product use that the GREET model. As such we believe the corn-ethanol values in BESS are more appropriate for developing the 2007 EISA GHG standards. Moreover, unlike other LCA models including GREET, the BESS model was developed by an interdisciplinary team of scientists with expertise in agronomy, soil science, ecosystem modeling, engineering, and animal science, and the development effort included input from biofuel industry professionals. We believe that an interdisciplinary effort is critical for developing LCA protocols of biofuel systems.

The "cautionary tale" to be learned from our experience with corn ethanol is that before second generation biofuels can become commercially viable, we need anticipatory research to accurately document GHG emissions and environmental impact. We at the University of Nebraska-Lincoln have a vision of how to make that happen, and it would involve a wide regional collaboration.

For each biofuel crop, research must be conducted at a production scale to determine the impact of feedstock crop production system on greenhouse gas emissions, soil carbon sequestration, and on soil and water quality and wildlife. For example, besides unused woody biomass and sawdust from forestry systems, switchgrass is the next most likely commercially viable cellulosic biofuel crop. Therefore, we must identify the key knowledge gaps about the environmental impact of switchgrass systems and invest in research to close them.

The University of Nebraska is developing research to support development of carbon intensity standards and certification protocols for switchgrass. While the environmental benefits of cellulosic ethanol production are estimated to be larger than for grain-ethanol, these benefits have not been validated in large production-scale field conditions that are representative of commercial production. Instead, to date most estimates have been produced by models and assumptions based on data from relatively small-scale research over relatively short periods. In fact, our initial investigations to date suggest that the direct-effect GHG emissions reduction potential of switchgrass is about the same as for corn ethanol unless switchgrass has a larger potential to sequester carbon in soil. Validation of benefits under production-scale conditions will help guide development of appropriate policies and markets and reduce risks to producers by helping to ensure that GHG emissions reduction estimates are based on the best available science.

Therefore, for each promising biofuel, such anticipatory research would require the following elements:

- Production-scale research on environmental impact of feedstock crop production systems, including GHG emissions, soil carbon sequestration or loss, and impacts on water and soil quality, other environmental services;
- Collaboration with industry to obtain the most recent estimates of biorefinery energy efficiency and GHG emissions from feedstock conversion to biofuel at a commercial scale;
- For indirect effects, more detailed understanding of complex interactions that govern land use change is required through development of appropriate econometric models, with strong collaborative input from biophysical scientists; and
- Development of software tools that can be used to perform LCA–GHG emissions assessments, and these tools must be widely accessible, transparent, user-friendly, and based on best available science published in refereed scientific journals.

In summary, I realize that EPA is on a relatively short timetable to publish the proposed rule for comment this fall and the final rule in the spring 2009 as stipulated in the 2007 EISA. But it is imperative that EPA use the best science and most recent information in developing the LCA methods and standards for establishing GHG emissions from corn-ethanol because not doing so could have significant negative impact on the biofuel industry and the farm economy in general. In contrast, the guidelines for second generation biofuels will not have immediate impact because these biofuels have not yet been commercialized on a large scale, which gives time to refine and improve the guidelines as commercialization proceeds.

Finally, Mr. Chairman and Members of the Subcommittee, I want to commend you and your colleagues on the full House Agriculture Committee for recognizing the importance of developing the scientific tools required to support accurate lifecycle analysis by including it as a priority within the Biomass Research and De-

velopment Initiative of the new farm bill. This competitive grant program, jointly run by USDA and Department of Energy, includes a challenging set of nine objectives, including one on Energy and Environmental Impact, which specifically identifies "improvement and development of tools for lifecycle analysis of current and potential biofuels." Mandatory funds were provided for this program in the amounts of $20,000,000 in Fiscal Year 2009, $28,000,000 in Fiscal Year 2010, $30,000,000 in Fiscal Year 2011, and $40,000,000 in Fiscal Year 2012. It is my hope that additional discretionary funds are appropriated as well to ensure adequate funding research on environmental impacts of biofuel systems and development of accurate lifecycle assessment tools so that regulation does not once again precede scientific understanding with potentially negative consequences for on viability of the biofuel industry.

Mr. Chairman and Members of the Subcommittee, I hope I've been able to provide some helpful information about the urgent need for the best available science and accurate data for determining the lifecycle environmental impact for the next generation biofuels, and about how to help ensure that this is accomplished. As a step in the right direction, it is imperative we get the numbers "right" for both corn ethanol and the second generation biofuels to come before significant investments are made by industry or producers. I am happy to answer any questions.

University of Nebraska Lincoln

Establishing Methods for Estimating Greenhouse Gas Emissions from Biofuel Systems: *Achieving Scientific Consensus*

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University of Nebraska-Lincoln

House Agriculture Subcommittee Testimony
July 24, 2008

Energy Independence and Security Act of 2007

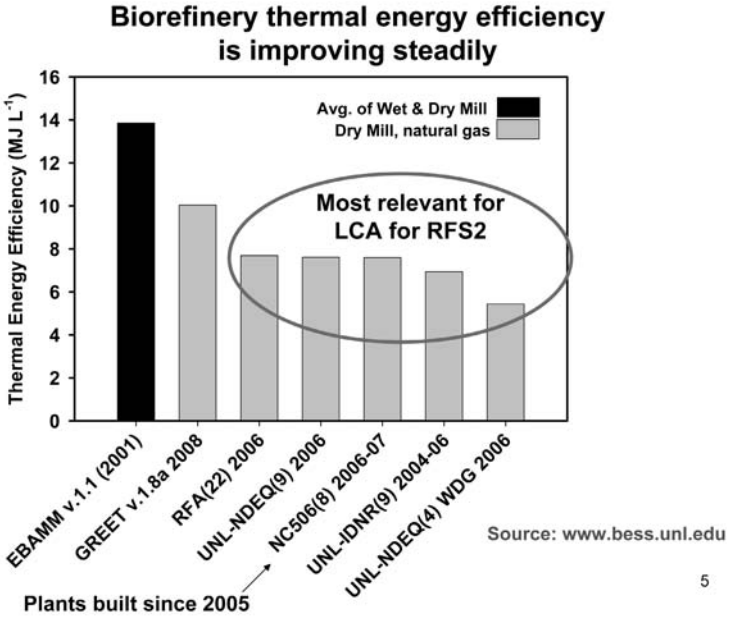
- Life-cycle assessment (LCA) greenhouse gas (GHG) emissions:
  "the aggregate quantity of GHG emissions (including direct emissions and significant indirect emissions such as from land use changes), related to the full fuel lifecycle, including all stages of fuel and feedstock production and distribution"
- Sets GHG emission reduction thresholds compared to gasoline:
  - **Starch-ethanol (corn): -20%**
  - **Cellulosic ethanol: -60%**
  - **Advanced biofuels: -50%**
- Appropriate life-cycle methods and models will be established by the EPA by 2009
  - California and other states developing LCFS; need for consistency between federal and state LCA thresholds

Need to get corn-ethanol right

- **Due to rapid expansion of corn-ethanol production capacity (~12 billion gallons by end of 2009), the RFS2 GHG standards will have immediate impact on:**
  - **Implementation of low carbon fuel standards (LCFS) in CA and other states**
  - **The role of corn-ethanol in contributing to GHG mitigation under proposed climate change legislation**
  - **Availability of government and private-sector loans for new plants or for expansion/improvements to existing plants**
  - **Public perceptions about "public goods" contributions of corn-ethanol**
- **Important to use updated information and best science to estimate GHG emissions for corn-ethanol based on current industry performance**
  - **More than 60% of current ethanol production comes from plants established since 2005**
- **Updated data are available for direct-effect GHG emissions from crop production, ethanol conversion, and co-product use in the corn-ethanol production life cycle *at a production scale***

Need to get corn-ethanol right

- **Development of software tools to make LCA GHG assessments**
  - **Widely accessible, transparent, and based on best available science published in refereed scientific journals**
  - **Useful for RFS2/LCFS compliance and GHG emissions trading**
  - **Example: BESS model for corn-ethanol (www.bess.unl.edu)**
- **Indirect effects much more difficult to estimate and highly uncertain**
  - **At what volume of corn-ethanol production (12, 15, 18, or 30 bgy?)**
  - **Requires assumptions about future currency exchange rates, land use policies in key countries, and rate of gain in crop yields on existing crop land?**
  - **Uncertainty of the estimate is larger than the estimate itself**



Results from different life-cycle GHG models

Life-cycle GHG emissions intensity from dry-mill corn-ethanol (gCO2e/MJ)				
Emissions	GREET	EBAMM	BEACCON	BESS (NC506-8)
Crop	44	37	44	29
Biorefinery	43	64	37	30
CP CREDIT	-17	-25	-17	-18
Denaturant	-	-	6	-
Land use change	(*104*)	-	1	-
GWI	70	76	71	43
Gasoline	92	92	92	92
GHG reduction, %	24	17	23	54

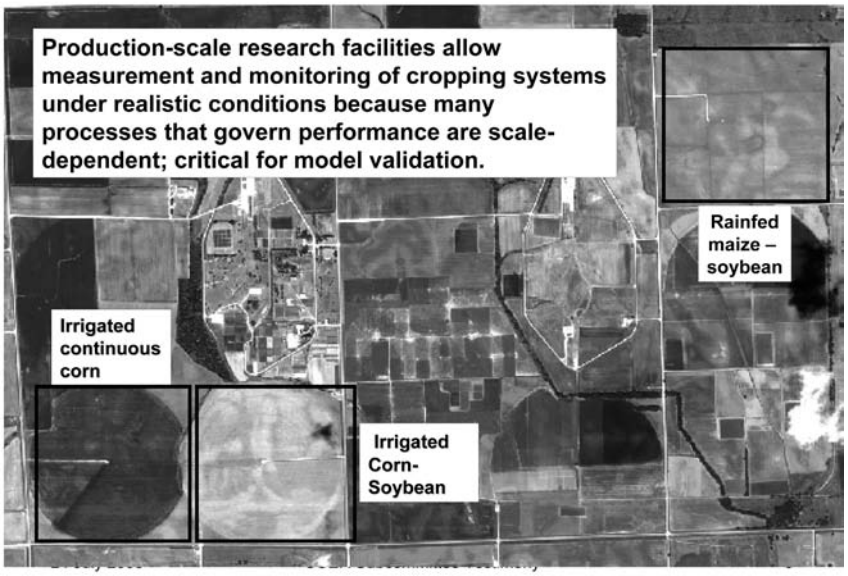
GREET vs.1.8a: land use change from Searchinger et al. Science 2008.
EBAMM: vs.1.1-1: Farrell et al. 2006, Science, "Ethanol Today" avg. ethanol plant in 2001.
BEACCON vs.1.1: available from www.lifecycleassociates.com; largely based on GREET.
BESS: vs.2008.3.0: (Scenario 1) Midwest avg natural gas dry mill (RFA), Midwest avg.; (Scenario 5) NE avg n.g. with wet DGS.
BESS has a variable co-product credit which is dependent on the emissions intensity of displaced crop production.

6

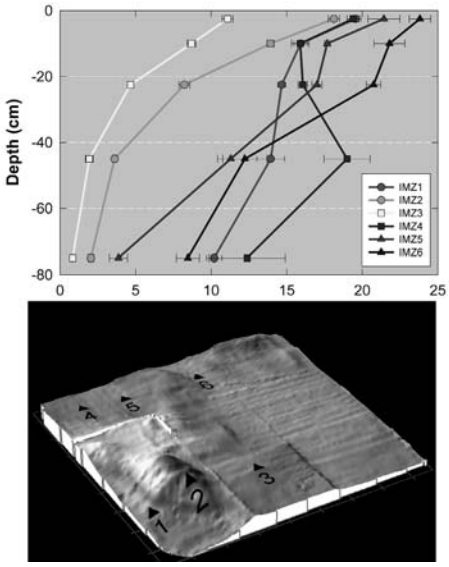
How to achieve scientific consensus on GHG emissions and environmental impact of second generation biofuels?

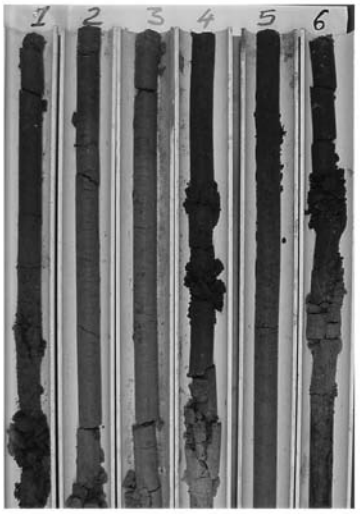
- **Ensure adequate investment in "anticipatory" research on environmental impact of biofuel systems**
  - Impacts on GHG emissions, soil carbon sequestration, water and soil quality, other environmental services
  - For direct effects, it requires *production-scale research* on all phases of life-cycle: crop production, ethanol biorefinery, co-product use with adequate measurement and monitoring to develop robust models and assessment tools (requires a highly interdisciplinary research approach)
  - For indirect effects, more detailed understanding of complex interactions that govern land use change is required
- **Develop software tools to make LCA GHG assessments**
  - Widely accessible, transparent, user-friendly, and based on best available science published in refereed scientific journals
  - Useful for RFS2/LCFS compliance and GHG emissions trading

24 July 2008 House Agriculture Subcommittee Testimony 7



Requires geostatistical procedures to deal with spatial variability





Scaling Process

Leaf/plot Level → Landscape Level → Regional

Goals of a Production-Scale Research Facility to Assess the Environmental Impact of Second-Generation Biofuels

- Establish production-scale fields most promising biofuel crops (switchgrass, miscanthus, others?) using the best available varieties and management practices
- Equip the field with tower eddy covariance flux instrumentation to measure daily flux of CO_2 to quantify the annual carbon sequestration or loss
- Monitor emissions of other GHG gases (CH_4, N_2O), and measurements of soil and plant variables (soil moisture, soil carbon, biomass, leaf area) to understand controls on GHG fluxes, and use this information to inform crop and ecosystem modeling efforts
- Conduct research on the yield, production costs, and net impact on GHG emissions using appropriate life-cycle analysis methods, collaborate with scientists researching indirect LUC, and contribute to development of compliance tools for assessing GHG emissions from biofuel systems
- Conduct comparative studies of environmental benefits of different biofuel feedstock production systems
- Collaborate with industry on research to develop harvest, handling and storage technologies
- Validate findings and models at a series of satellite research sites in wider range of environments

The CHAIRMAN. Thank you, Dr. Cassman. Dr. McDill.

STATEMENT OF MARC E. MCDILL, PH.D., ASSOCIATE PROFESSOR OF FOREST MANAGEMENT, SCHOOL OF FOREST RESOURCES, PENN STATE COLLEGE OF AGRICULTURAL SCIENCES, UNIVERSITY PARK, PA

Dr. MCDILL. Thank you for giving me this opportunity to speak to you today about the potential use of wood biomass for energy. While much of what I will say applies at a national level, my expertise relates primarily to the northeastern U.S., specifically Pennsylvania, so my testimony will be informed by this regional perspective.

First, allow me to tell you a little about the forest of the northeastern U.S. Forests cover roughly ⅔ of the region. Furthermore, more than 85 percent of this forestland is privately owned with about 85 percent of that owned by families and individuals not associated with the forest products industry.

With the exception of Maine, the vast majority of this forestland is naturally regenerated second, third, and fourth-growth hardwood forest. We have very little old growth and few plantations. The northern U.S. has an abundant supply of wood however. In fact, in the last 50 years, the net volume of growing stock on forestland in the northern U.S. has doubled.

While the region produces some of the finest hardwood saw timber in the world, more than half of the wood in Pennsylvania's forest is classified as so-called low-use wood. Markets for this low-use wood are limited because we have a relatively small pulp and paper industry. Experts in sustainable forest management believe that improving markets for low-use wood, such as would exist with the growing biomass energy industry, will provide opportunities to better manage the regions forests.

These markets will provide income for land owners to help offset management costs. They will make additional management practices, such as improvement thinning, commercially feasible. And they will reduce the incentives to high-grade forests. High grading is a practice where only the best trees are harvested, which degrades the species composition and genetic quality of the forest over time.

Low-use wood is an abundant and underutilized forest resource wherever there is a limited demand for pulpwood. For example, when western forests are thinned to reduce fuels, huge piles of low-use wood are left behind to rot for lack of a viable market. Under current law, this low-use wood from Federal forests and also from the naturally regenerated forests that are common in the Northeast cannot be turned into fuel that counts toward the Renewable Fuel Standard targets.

Frankly, it is difficult for me to understand the rationale for these restrictions. Despite the attention given to corn ethanol in recent discussions, wood is still the most important biomass energy feedstock in the U.S. Wood biomass is burned directly in heating systems for individual homes, commercial buildings, and institutions such as schools and hospitals. Wood is also burned directly or co-fired with coal to generate electricity.

Right now, biomass-based energy is the primary alternative to fossil fuels for producing liquid fuels. When the promise of cellulosic biofuels is realized, Pennsylvania could replace ⅓ or more of the gasoline used in the state with wood-based ethanol and other advanced biofuels.

Of course, there is great uncertainty about how all this will play out. We don't know the true lifecycle greenhouse gas savings of using wood for biofuels. We don't know exactly how much low-use wood will really be available and at what cost. We don't know the extent to which private landowners will allow biomass harvest on their properties. We don't know exactly how growing markets for biofuels will change forest management practices, and we don't know the exact environmental impacts of removing more biomass during harvest.

At Penn State, we are working to answer some of these questions. In particular, we are trying to carefully quantify biomass yields and the cost of harvesting, collecting, and transporting wood biomass based on actual field operations. We are also assessing the environmental impacts of these operations.

Wood has obvious advantages as a biofuel feedstock. The U.S. has an abundant supply of wood biomass that is currently greatly underutilized. Better use of this resource could complement existing wood products industries and promote improved forest management. And unlike corn, using wood does not compete with food production.

We must broaden the definition of cellulosic ethanol within the Renewable Fuel Standard to include at least low-use wood biomass harvested from natural hardwood forests and probably other things as well. But that is what I am particularly interested in from my state.

Thank you again for giving me this opportunity to speak to you, and I look forward to answering your questions.

[The prepared statement of Dr. McDill follows:]

PREPARED STATEMENT OF MARC E. MCDILL, PH.D., ASSOCIATE PROFESSOR OF FOREST MANAGEMENT, SCHOOL OF FOREST RESOURCES, PENN STATE COLLEGE OF AGRICULTURAL SCIENCES, UNIVERSITY PARK, PA

Thank you for giving me the opportunity to speak to you today about the potential use of wood biomass for energy. While much of what I will discuss applies at a national level, my expertise primarily relates to the northeastern U.S., specifically Pennsylvania, so my testimony will be informed by this regional perspective.

Forests are the dominant land use in the northeastern U.S. Roughly ⅔ of the region is forested. Furthermore, more than 85% of this forestland is privately owned, with about 85% of this private forestland owned by families and individuals not associated with the forest products industry. The vast majority of this forestland (with the exception of Maine) is naturally-regenerated second- or third-growth oak-hickory and northern hardwood forests. The northern U.S. has an abundant supply of wood. Between 1953 and 2007 the estimated net volume of growing stock on forestland in the northern U.S. more than doubled, from 103.7 billion cu ft to 248.0 billion cu ft. USDA Forest Service Forest Inventory and Analysis (FIA) data indicates that Pennsylvania's forests alone contain 1,146 million green tons of biomass. (A green ton is equivalent to about half a ton of dry biomass.) More than half of the wood in the state has been classified as so-called "low use" wood. Due to a relatively small pulp and paper industry in the region, markets for this low use wood are limited.

Most forest landowners and proponents of sustainable forest management believe that improved markets for low use wood—such as would exist with a growing biomass energy industry—would provide opportunities to better manage the region's forests. Such markets would provide additional income for landowners to help offset

management costs; it would make additional management practices, such as improvement thinnings, commercially feasible; and it would reduce incentives to high-grade forests (a practice where only the best trees are harvested, degrading the species composition and genetic quality of the forest over time). Low use wood is abundant wherever there are forests and limited demand for pulpwood. For example, in much of the western U.S., material from thinnings done to reduce fuels, and hence the susceptibility of forests to devastating wildfires, is currently being collected in huge piles where it is typically left to rot for lack of a viable market. It is my understanding that much of this low use wood—from both the natural, private forests in the East and from western Federal lands—cannot currently be counted toward the Renewable Fuel Standard (RFS) targets. Frankly, the rationale for this is difficult for me to understand.

A crucial advantage of biomass-based energy is that it currently is the most economical alternative to fossil fuels for producing liquid fuels. In spite of the attention given to corn ethanol in recent biomass energy discussions, wood is still the most important feedstock for biomass energy in the U.S. This is largely because the wood products industry has long been very efficient in its use of residues produced in sawing lumber and making pulp. Wood biomass can be burned directly in heating systems, for both individual homes and for institutions such as schools, hospitals and commercial buildings. Wood can also be burned to directly generate electricity or in combined heat and power facilities. And wood can be co-fired with coal to produce electricity. Wood pellets produced from sawdust are now a very cost-competitive fuel for residential heating. When the promise of cellulosic biofuels is realized, Pennsylvania could potentially replace up to ⅓ of the gasoline used in the state with wood-based ethanol and other advanced biofuels.

There are, of course, many uncertainties about how all this will play out over the coming years. It is uncertain what the true lifecycle greenhouse gas savings are in these processes relative to fossil fuels. Another key question is how much low use wood is really available at what cost. There is some uncertainty as to how much of this low use wood there actually is, and few attempts to quantify this resource have even tried to accurately assess how the available amount would vary with different prices. Key factors affecting the quantity that would be available at a given cost include harvesting and transportation costs. However, an important related question that is even more difficult to answer is the extent to which private landowners would be willing to allow harvesting on their properties. Many surveys of forest landowners have shown that earning income from harvesting wood is a low priority for many of them. Also important is the question of how growing markets for biofuels will change forest management practices. Again, in many cases having these markets will improve forest management by providing additional income and paying for practices that are currently not commercially viable. However, increasing use of wood for biofuels could lead to shorter rotations and shifts from natural forests to plantations. To what extent will it be cheaper to simply grow wood in short-rotation biomass plantations (either switchgrass, or tree species such as hybrid poplar and willow)? What will be the environmental impacts of removing more biomass during harvests? Removing more biomass means removing more of the nutrients from the site and reduction of woody debris which provides important habitat. Also, more intensive harvesting practices could lead to soil compaction and more roads, further fragmenting already fragmented forests.

The research we currently are doing at Penn State attempts to answer only a few of these questions. In particular, we are trying to do a better job of quantifying biomass and other product yields and harvesting, collection, and transport costs based on actual operations in the field. We are also planning to assess soil nutrient impacts and compaction. We are looking to expand this research to look at a larger set of the questions discussed above.

I hope my comments have helped give you a broader perspective on the potential of wood as a biofuel feedstock. Wood has obvious advantages for such uses. First, the U.S. has an abundant supply of wood biomass that is currently not being used. Use of this resource could be complementary to existing wood products industries and promote improved forest management. And, unlike corn ethanol, using wood does not generally compete with food production. It is important to significantly broaden the definition of cellulosic ethanol within the Renewable Fuel Standard (RFS) to include wood biomass from all sources. Thank you again for giving me this opportunity to speak to the Subcommittee. I look forward to answering your questions.

The CHAIRMAN. Thank you, Dr. McDill. I have a question I am not—anyone is going to want to answer, but all of you have identified the concern that we have had since the implementation of H.R.

6, the Energy Independence and Security Act and how parts of the country are going to be limited in being able to participate.

Does anyone care to say what could have been the motivation of the people who were encouraging the change in that language that happened in the last minute? What were they trying to achieve? Ms. Wong?

Ms. WONG. I think that they were trying to achieve environmentally sustainability. I thought that because it was done in a rush, maybe things did not turn out how they thought they would.

The CHAIRMAN. Dr. Cassman?

Dr. CASSMAN. Yes, I am struck in the deliberation of the Committee and the statements made by Members of Congress starting out this session. There seems to be a lack of communication, good communication between the Agricultural Committee and the environmental community, and you seem to be talking past each other.

The CHAIRMAN. That is not new but——

Dr. CASSMAN. And yet there is so much common ground that could be plowed. Another example is the language concerning indirect language change effects in greenhouse gas emissions. Clearly that was put in by the environmental movement with concerns about if we used every acre of land to produce biofuels not only in this country but globally.

And it also occurs to me I have never heard anyone talk—when you talk about indirect language change, the single most important thing we could do is focus tightly on accelerating the rate of gain in corn yields and other crop yields on existing land and do so at the same time while reducing environmental impact. It is a massive challenge.

We have never done that in the past. We have increased yields but had negative environmental impact. And we can reduce environmental impact simply by reducing yields, reducing inputs. We have never done both at the same time, and so it seems to me there is a lot of common ground between the two groups, but there doesn't seem to be an honest broker effort to bring together and focus on the things that can make both groups achieve their goals.

The CHAIRMAN. Anyone else care to comment? Mr. Grant?

Mr. GRANT. Mr. Chairman, it would be my observation as a producer and an individual involved with numerous associations that have dealt with this issue that there was perhaps a misperception on the part of the environmental community that producers, farmers, would be very quick to make the change. That they would use existing ground, ground that is currently in production and divert that ground to the production of switchgrass, other biofeedstocks, and then pass on the opportunity to produce conventional crops.

In conversations we have had with environmental groups, we have maintained and repeatedly asserted that our producers simply aren't interested in that. That in the future when biomass crops become an economic reality, definitely we will look at those in the context of competing crops. But today we believe that biomass cellulosic production will evolve primarily using waste from production of existing crops. And we think that message just hasn't resonated with the environmental community, hence this language is our belief.

The CHAIRMAN. Mr. Burke.

Mr. BURKE. Mr. Chairman, I think that the language does show the footprints of special interest, and I think that the language ignores a very valuable supply of low-value hardwood and other woody biomass that is geographically spread across our country.

It also ignores many healthy forest practices that will not be incentivized or encouraged by very narrow definitions of particular types of thinning so——

The CHAIRMAN. And all of us on this Committee are well aware of the need to change this definition. Ms. Herseth Sandlin has legislation, I believe other people do as well. But again all of you have mentioned this and the Chairman and Ranking Member had in their comments as well as Mr. Lucas and myself. But just once again for the record, if we do not change the definition of *biomass*, what regions of the country would be winners? What regions of the country will be losers? And who will be able to participate and not participate? Anyone care to comment?

Dr. MCDILL. Well, clearly the northeastern U.S. is a big loser because again we have all of these hardwood forests which are naturally regenerated, and it would be very hard to include this in the definition of *renewable fuels* as it currently stands.

Now, interestingly, it is exactly where you don't have plantations where you have the most low-use wood that should be available, which could be used and currently is underutilized. So the plantations exist where you have pulpwood markets, where you have a pulp mill, where you already have a market for that kind of wood. That is where you have the plantations.

Where you don't have a pulpwood market, then that is where we have all this low-use wood. So the northeastern U.S. and also the intermountain West, where again, we have all of this material from thinning for fuel reduction treatments, which can't be utilized either under the current definition.

The CHAIRMAN. Thank you. My time has expired. Mr. Lucas?

Mr. LUCAS. Thank you, Mr. Chairman. And since we have a group that represents insights from all over the country, let us just cut to the chase. Some of the groups that we have been discussing in a roundabout way are clearly paling, screaming to the top of their lungs that the renewable biomass restrictions in the RFS will help protect forests and wildlife habitat. If anyone on the panel would care to offer a comment or an opinion about whether that is an accurate statement on what you are aware or not, I would be very interested.

Mr. BLAZER. Mr. Chairman, Ranking Member, Members of the Committee, the problem that I have with that in regards to the fuel loads that we see in our western forests, looking at it from a watershed perspective, if we don't get these forested lands back in shape and get those fuel loads reduced, it is not going to be a good thing. Because we are going to have catastrophic fire. We are going to lose wildlife habitat. We have to get this thing turned around, the redefining of this definition is going to be critical for that.

Mr. BURKE. I do not agree with that statement. I don't think that a limited definition will, in fact, protect our forests or the wildlife habitat. I think the restriction is counterproductive to many valuable goals. For example, a healthy forest. Many thinning practices would be excluded from the definition, and these thinnings lead to

healthy forests. They reduce fire risk. They decrease the risk of insect and disease damage. They provide for better trees and hence better habitat.

Also a restricted definition is not open and inclusive with respect to markets, and this puts family forest owners at a disadvantage and may in fact result in conversions of forestland to other uses if the forestland cannot produce a fair rate of return.

Finally, forests give us many advantages. Not only the fiber and the wood but watershed for water quality and wildlife habitat. So I think the limited definition is not protective of these values but in fact counterproductive.

Dr. MCDILL. Well, as I stated in my testimony, having markets for low-use wood helps land owners manage their forests better. So from that perspective, the definition is counterproductive. Furthermore, it is also counterproductive because it could create incentives to convert natural forestland to plantations so that it would count under the current standard.

So the best way to achieve sustainable forest management is not really through definitions, how we define renewable fuels. The best way is through other means of providing incentives and best management practice guidelines for landowners to help encourage them to manage sustainably.

Ms. WONG. And on that note, I think that we would absolutely agree. The definition shouldn't be based on these distinctions of ownership. They should be based on management practices for forests. The RENEW NY will be using forests that are probably some of the healthiest forests in New York. Doesn't matter what their ownership is. It should matter how many bird species they have, what the water quality is. So I think we would absolutely agree with that.

Mr. LUCAS. Mr. Chairman, the panel has been very precise and clear. Thank you.

The CHAIRMAN. The chair thanks the Ranking Member and recognizes the gentleman from Indiana, Mr. Donnelly.

Mr. DONNELLY. Thank you very much, Mr. Chairman. Dr. McDill, there are a lot of questions. What do you need to do to get answers? You said well, we have a question about this and we have a question about that. And what kind of resources do you need to get answers and how soon can we get those answers?

Dr. MCDILL. Well, researchers tend to emphasize the uncertainties. I want to maybe say right up front that there is a lot that we do know. But there still—it is true that there is a lot of uncertainty. We need better support for research in addressing these kinds of questions.

We need time to get some of these research activities going on the ground. We just got a research grant this spring, and so then it takes a little while to get research going. But basically we need the resources to do research to better understand what the lifecycle gains really are.

We need research to look at how much is really going to be available. Basically we need—a lot of the data is actually there, and a lot of things we can look at. We just need time, and resources, to do the analysis.

Mr. DONNELLY. Okay, and then this is for anybody on the panel. My state has a lot of hardwood production, and in fact, every year we manage these forests. We take a lot of product out, and we have more acres of forest in our state now than at any time in the last 100 years. And so is there any reason why we can't take more biomass out and be able to manage it efficiently?

It seems to be working at this time if we take more biomass out for fuel or whatever. The skills for proper management are in place, aren't they?

Mr. BURKE. I will be happy to address that. Virginia is similarly situated. We have much naturally regenerated hardwood. It is of good quality, and properly managed, it can be sustainably grown successive track after track. And it would be advantageous to have an additional market for the low-value hardwood so as to improve the residual stand. So we have a similar tract pattern in Virginia.

Mr. DONNELLY. And I read in *The Economist* a few weeks ago—and I don't know how exactly correct they are. But they said if we used the biomass we have in this country on a renewable basis that will come back on a constant basis and not change anything, we could meet 65 percent of our petroleum needs in the years ahead. Does that seem reasonable to all of you?

Dr. MCDILL. Well, as I stated in my testimony, the amount of wood in northern forests had doubled in the last 50 years. So we are currently not harvesting at the rate that the forests are growing. So clearly we could harvest more than what we are harvesting right now. Through better management, we could increase growth rates and harvest no more. Sixty-five percent, frankly, sounds a little bit high to me, but I think, as I said in my testimony, a third—at least in heavily forested regions like the Northeast, a third of our liquid fuels requirements could be met with cellulosic.

Mr. DONNELLY. And is a lot of this dependent on better cellulosic ethanol technology?

Dr. MCDILL. We have Purdue in my state who is working almost nonstop on trying to develop the cellulosic ethanol technology. So my comment would be, and clearly representing production agriculture, we believe we have a key role to play on the cellulosic industry as it evolves, but also state right up front that we don't have the technology, just the practical, the fundamental technology that we need in place to effectively play in the cellulosic industry today.

We don't know, for example, on a specific geographic region-by-region basis exactly how much biomass we can remove and maintain the soil health so that it is sustainable. The ability to do the research is there. It just simply hasn't been done with this end goal in mind. Our end goals have been driven by completely different factors, different motivations for the last 50 years that research has been done. So if, in fact, we are to be tasked with producing fuel to the level, Congressman, that you indicate, I believe we can rise to the challenge. But we will need some research to do that.

Ms. WONG. I would absolutely agree, and I think that that is something that is critically important. We have talked about research needs. There was a billion ton study that was done by USDA and DOE, but it really needs to be done again and in a mode where we are looking at soil type by soil type and the dif-

ferent feedstocks that are out there. I think the important thing to point out is that there is a wide variety of feedstocks that we can use that are low value like the forest thinning, the municipal solid waste, that will not have a land impact. And I think that that is really important as we are looking at some of the environmental and climate effects that we have been talking about.

Mr. BURKE. If I might build on one of Ms. Wong's points, feedstock is key. There are three elements to a successful cellulosic production: feedstock, technology, and scale, facilities of scale. And if you get the feedstocks wrong, you have to start all over. And if you limit the available feedstocks with artificial definitions, you have started off on a bad beginning point.

Mr. DONNELLY. Thank you very much. And, Mr. Chairman, we have a golden opportunity here, as you well know, to use products from your state and my state to keep our funds here and our resources here instead of sending them over to another part of the world.

The CHAIRMAN. I thank the gentleman. The gentleman from Nebraska.

Mr. FORTENBERRY. Thank you, Mr. Chairman, for holding this hearing. Although Nebraska is the home of Arbor Day, we are generally not known for forest production. But nonetheless, since this is the topic at the moment—then I will pivot to another issue—I would just like to tell a story, Mr. Chairman.

I was coming home from the airport recently, and along the side of the road was a huge pile of wood that was compost for some apparent development purpose, just burning. And I hadn't seen that in a very long time, and I just—the mental thought came to mind what a waste. And in terms of low-use biomass or woody pulp maybe perhaps being not the second but the third generation of cellulosic opportunities, I think we need to take a serious look at that. And I appreciate you bringing this up.

I would like to go back to the discussion about the Renewable Fuel Standard and biofuels in general and to talk about some synergistic technologies that are greatly improving efficiencies that are important to add to this overall discussion. In order to know where we go, I think it is important to know where we came from. Just a few short years ago, 2005, we implemented the first Renewable Fuel Standard. We have expanded that this year, and in doing so, that was a very, very long arduous legislative fight, much of which took place before I got here.

I thought it was a very important move to—remember we were trying to replace the pollutant additive in gasoline, MTBE, with something that would be more environmentally friendly. Corn was below $2 most of the time, looking for a way to expand our market for farmers and therefore save money on support programs in the government and help stabilize—help provide another opportunity for our farmers.

And so this whole industry, which had been worked on, of course, for decades, but was launched in a very, very rapid way and now has tremendous potential to expand.

Now, it is always important to look at policies to ensure that we haven't overreached and affording later-causing dislocations and unintended consequences elsewhere. But there are some important

weddings of technologies that are going on right in Dr. Cassman and my backyard, one of which is a closed loop energy system in which a cattle field lot is co-located next to an ethanol plant: 30,000 head of cattle. The manure is captured from them, put into a methane digester, and then the surrounding farms, of course, bring the corn there for ethanol production. The distiller's grain byproduct is then fed back to the cattle. The phosphorus, by the way, is pulled out of the manure, which is the environmentally difficult component of manure, and sold as another product adding further value there.

So in very simplistic terms, while we, of course, want to see the energy output-to-input ratio increase dramatically on traditional ethanol production, corn-based ethanol production with the underlying fuel sources, perhaps natural gas being less than 2:1. This plant, this closed-loop energy system moves that equation to 5:1 of output to energy input.

Another plant in my district is Tide. Its energy source, the local landfill, and now supplants its natural gas usage by about ⅓, which again is another way to calculate, improve, vastly improve energy output-to-input equations.

There is a farmer in my district who has taken—he is a hog farmer. He has 8,000 head. He creates methane from a methane digestion pit. Now, he hasn't chosen to use that methane to run an ethanol facility, but he generates electricity on the spot with it and 8,000 head of hogs. And the power in their droppings, so to speak, creates enough electricity for 40 homes.

I bring all this up to not only—to add a dimension to the discussion of the overall development of biofuels as we look forward to this next generation of cellulosic sources that will decrease pressures on traditional grain sources and also hopefully improve efficiency. But also to think through the synergistic opportunities we have to co-locate inputs and outputs as well that will help secure and mitigate questions about the energy efficiencies of biofuels as we look to it as a component, just a component, in the overall portfolio of energy opportunities that we have in our country.

So that is a speech not a question, Mr. Chairman, but if anybody would like to respond to that, I would welcome comments.

Ms. WONG. I would actually like to respond to that. I am really happy that you brought up the historic reasons why this country has looked at renewable fuel. I think it is also going to look at what that could mean for woody biomass. We really need to increase that value of woody biomass because our forests are disappearing. Thirty-one million acres could disappear by 2040 because of urbanization in the Southeast. We need to keep forests as forests for water, wildlife, carbon sequestration, several other reasons.

So I think providing value to agriculture products is extremely important and will be very important. But it is the same thing for woody biomass. So I think that is one of the reasons why we need to make sure that this definition will be very inclusive when it comes to that.

Mr. GRANT. If I could, I would appreciate if the context of the holistic system as you referred to—and I think it is important to point out a couple of key issues there. I am familiar with methane digesters because we actually have a dairy and have one there.

And one of the drivers are regulation and the need to deal with the phosphorus, as you mentioned, and that system helps to accomplish and meet the demands of that driver.

So I bring that up only to illustrate the point that we have an RFS which is serving as a driver for ethanol at large and to a large extent also for cellulosic. We are not sure yet how the cellulosic history is going to evolve, but certainly the most likely first plants will be plants that are built in these closed-loop type systems where you have the resources already there within a very close geographic location.

Freight in a cellulosic system is extremely important, and if we try to gather up resources from around the country, the efficiencies disappear. So it is just extremely important that——

Mr. FORTENBERRY. Well, if I could interrupt for a moment. Mr. Chairman, could——

The CHAIRMAN. Please.

Mr. FORTENBERRY.—you indulge me for an additional moment? I think that is important in pointing to the opportunity we have, and my comments were already toward this as well to think about smaller scale distributed generation of this opportunity. Use what we have considered waste rather than burning it on the side of the road or having problems with spreading it too thick on fields to pouring that in to again innovative, technologically sophisticated operations that may be, as we develop it smaller in scale so that they become common on even a regular, midsize working farm.

Our closed-loop system, I should point out, is on hold at the moment. We are looking forward to getting it back going, but it is very, very innovative.

Mr. GRANT. Congressman, I will make my point. The RFS is a driver. Investment is responding to that as a driver. I think we need to be careful as the Committee—I guess I would encourage the Committee to be careful in advocating quick changes to the RFS because there are investments taking place built on that driver today. And we will have plenty of time in the future to fine tune where we go.

Mr. FORTENBERRY. Dr. McDill?

Dr. MCDILL. Yes. I just wanted to say that you are absolutely right. The situation is changing really rapidly, and new technologies are coming online. And some of the things that we were hopeful might be really good are turning out to not be so good. So I think it is really critical to have some flexibility, and having the kind of restrictions in the biomass feedstocks that are in the law right now is exactly the kind of thing that makes it difficult to have the flexibility to develop a lot of these new kinds of technologies.

Mr. FORTENBERRY. Thank you, Dr. McDill.

The CHAIRMAN. The gentlewoman from New York.

Mrs. GILLIBRAND. Thank you, Mr. Chairman. Thank you all for coming to testify. I very much appreciate your expertise and your commitment to these issues. I want to talk a little bit about the Northeast and what you think will happen. First, if the rule isn't changed and the definition isn't changed, and then, second, if it is changed to allow for—excuse me—to allow for the use of woody biomass particularly from our forests through management of our forests.

In particular, if they don't change the rule, will we not be able to use our forest for cellulosic ethanol under the current legislation that the House has passed?

Dr. MCDILL. You know my understanding is it is probably going to happen even if you don't change the rule. It just won't count.

Mrs. GILLIBRAND. The market today, because I come from upstate New York where we have the Adirondack and the Catskills. We have massive beautiful natural resources that with good stewardship practices and good forest management we will have enormous availability for cellulosic ethanol production. And we are hopefully having a cellulosic ethanol plant being built right now in the Port of Albany that could be easily used to develop that fuel source.

So what I would like some more analysis on is if the rule isn't changed, is it going to stifle investment? Or do you think the horse is actually out of the barn and we will have investment and this will be one of the future fields that we use? Will we be able to use woody biomass and forestry management in the Northeast as a real alternative fuel?

Dr. MCDILL. I think it is going to happen whether the rule is changed or not, but certainly it doesn't help. The current rule doesn't help. So it certainly would help to change the rule. I think you would see faster development than what would happen with the rule that is there right now. But the economics are driving it as much as the policy, and it is going to happen. We are building a cellulosic ethanol plant in Clearfield, Pennsylvania near State College where I live so these things are coming online. But certainly it would help if we would change the rule.

Ms. WONG. I would definitely agree with that. I think one of the issues that we have right now is that we have several companies out there, and EESI just released a fact sheet that there could be 55 different biorefineries in 31 different states in the next couple years.

But what the rule does is that, first, it is going to limit innovation. And for the companies that are still trying to site facilities or figure out where there might be the appropriate feedstock, they might decide that the Southeast might be better because of this or the Northwest might be better because of that.

And so this definition is really important because there are certain things that are basically excluded. So the Northeast, because of the naturally regenerated forest there, might have a very difficult time getting a biorefinery to actually site there.

Mr. BURKE. I think the preferred approach would be a legislative change to simplify the definition because where we are going to end up without that is unnecessary complexities as this unclear language leads to regulations and rule making. And then you are going to have disputes and complexities as the laws and the regulations are tried—we try to implement them on the ground. And there is going to be litigation, trial court litigation and appellate court litigation over what these words meant in the statute and in the rules. And then we were going to look back, and we are going to say that was a great law. Why didn't it work?

Mrs. GILLIBRAND. Right.

Mr. BURKE. I think it would be better for the definition of *renewable biomass* not to be the reason it didn't work.

Mrs. GILLIBRAND. Correct.

Mr. BURKE. And the simple fix is legislative.

Ms. WONG. I think the other thing that is extremely important is that, as has been said this definition came up at the last minute. There are several other different definitions for *biomass, renewable biomass, open loop* and *closed loop biomass* that are already in public law. I think that this would set a very bad precedent for further legislation. And I think that that is going to be really important as we look to develop a biomass industry in the United States.

Mrs. GILLIBRAND. And the other aspect of the rule and the law that I want you to touch on is, in the Northeast we have about 17 percent of public lands, and the rest is privately held. And the rule now requires it to be privately held. I think it would make an enormous difference because we do have the Adirondack Park, and we do have enormous land in the Catskills under conservation. But for the management practices that we would normally use to take out dead wood and to make sure that the forest is healthy, we could use that feedstock as well.

So that would be another area where I hope you will focus on your advocacy because I think it is very important that we have all the forests eligible.

And the last thing I wanted to address—I am out of time. Thank you, Mr. Chairman.

The CHAIRMAN. The gentleman from Kansas.

Mr. MORAN. No questions at this time.

The CHAIRMAN. Okay, the gentlewoman from Kansas.

Mrs. BOYDA. Thank you, Mr. Chairman. And would you like to—I will yield to you a minute. My friend from New York, did you want to ask your final question?

Mrs. GILLIBRAND. Yes, I just wanted to ask what is the rate of percentage of input *versus* output ratio for woody biomass—if you say corn-based ethanol is 1:1, maybe 1:2. Is woody biomass, based on wood pulp, 1:10? What is it? What is the ratio?

Dr. MCDILL. There is a lot of uncertainty about that number, but if I were to give you sort of a best estimate, I would say 1:4.

Mrs. GILLIBRAND. One to 4. Thank you.

Dr. CASSMAN. I would like to just comment on that, Congresswoman. I think the danger there is that you are comparing a hypothetical system with an actual system. You have to be very careful. What we are finding with cellulosic ethanol from switchgrass, where we are starting to get some numbers, is that the numbers are falling down. And it falls down as you scale up, and it looks like the cellulosic ethanol from switchgrass, the key is going to be whether or not it sequesters carbon. And if it doesn't, it is going to be not much better than corn ethanol. So I would be very careful about comparing hypothetical with actual.

And corn ethanol is much better than—again if you use numbers from the current majority of ethanol plants built since 2005 that are going to be producing the vast majority of our total ethanol from corn, the number is closer to 1.8. And if you do things, as Congressman Fortenberry said, the innovations that will come will put it well over two.

Mrs. GILLIBRAND. So 1–2? Okay, thank you.

Mrs. BOYDA. Yes, I just had a couple of quick questions, and you might have spoken about this earlier, but when do you think the cellulosic could actually be commercially viable for either switchgrass or for woody mass, anyone?

Ms. WONG. Well, as I just mentioned, we just put out a fact sheet from several months of research on different cellulosic biorefineries that have been looking to commercialize these different technologies: 55 different ones are saying that they are interested in moving forward, 31 different states.

There are several companies that have already received grants from DOE, from states that are ready to move forward whether or not that is a demonstration plant, a power plant, or a commercial facility. There were six commercial facilities that were awarded grants in 2007 by DOE. Four of them right now still exist and are trying to move forward. Range Fuels, for example, in Georgia should be up and running, I believe, by 2009. It might have been pushed back to 2010. That would be a commercial facility around 20 million gallons.

Let us just say that if all 55 of these biorefineries are able to make it forward, from looking at all the information, there could be up to 630 million gallons of cellulosic biofuels in the next 2 to 3 years. But, it really is going to depend on what happens whether——

Mrs. BOYDA. So you are saying that the first possible one might be up in 2010?

Ms. WONG. Well, it has already started construction, which is the first one in the United States commercially. So my understanding is 2009 to 2010 it will be in production.

Mrs. BOYDA. I get that question a fair amount as you can imagine. People are curious. They just want the information. Do you think then if we didn't include this woody mass, can we meet the RFS without it? Do we have to have it? Are we on schedule if on the best of all possible roads, is it going to happen?

Ms. WONG. I think it might be very difficult.

Mrs. BOYDA. Does anyone disagree with that? So I guess what I am asking is there room for everybody in the market? Is it for all players? What——

Ms. WONG. I think one of the important things is that for individual communities that have a biomass resource that they can use in a sustainable way, why should we limit them when they have the opportunity to participate in that market?

Mrs. BOYDA. Can I just ask one more quick question too? Just technology wise, would a plant that is able to use switchgrass also be able to use—could they go back—feedstocks could be the same; or are they different? That is yes, they can?

Dr. CASSMAN. In the initial phases, they will be fairly specialized. Later, I think the Holy Grail is to get a cellulosic ethanol system that could chew up anything.

Mrs. BOYDA. We have a 2½ mile log jam on one of the rivers that is causing a lot of problems, and I just wondered if that was a hope that might be out there sometime.

Dr. CASSMAN. Not in the short term.

Mrs. BOYDA. All right. Thank you so much. I appreciate your testimony.

The CHAIRMAN. I thank the gentlewoman and recognize the gentleman again.

Mr. MORAN. Thank you, Mr. Chairman. A follow up to the gentlewoman from Kansas's question. Mrs. Boyda is correct. We are often asked about the potential of cellulosic ethanol and mostly in regard to a timeframe. And I wanted to see if I could get a clearer understanding of when that is. There are lots of proposals out there. Is there a particular technology or product that holds the highest promise? And under the best of scenarios, is this something that—will we see a significant cellulosic ethanol component to our energy mix in the next year, the next 2 years, the next 5 years, the next 10 years? What do we see developing over the next decade?

Dr. CASSMAN. A quick answer is that it depends what you are asking in terms of volume. If you are talking 1 billion gallons a year, 10 billion or the 20 that is required under the Renewable Fuel Standard. It is going to take 5 to 10 years to get up to the billion gallon level.

And the biggest challenge is not the science and technology in the conversion process. It is the science and technology of the harvest, storage, and transport of large bulky material and the quality control therein. These are the things that really are not getting a lot of attention in the whole program and system; and the infrastructure therein of how you handle it.

Mr. MORAN. That is interesting because I think the difficulty we face in ethanol, in corn-based ethanol today is more related to infrastructure than it is related to the process. Let me ask would we then be unable to meet the Renewable Fuel Standard in your opinion, in your estimation, as required for cellulosic ethanol?

Dr. CASSMAN. As we are currently going and funding, yes.

Mr. MORAN. My guess is we knew that actually when we created the standard.

Dr. CASSMAN. Right, but you are making major steps here, and everyone assumes that as successes are found, as we go along—55 plants you mentioned. No two of them have identical technologies, and so you are in this incredible race to sort through options. And that gets back to this question of what is the ratio of energy. It depends on what the final winners are in this technological race to see which kinds of second generation ethanol are going to win.

Mr. MORAN. What is the consequence to starch-based ethanol with the development of cellulosic? Does one replace the other?

Dr. CASSMAN. Tell me what the price of oil is when this occurs because it depends on the price of a barrel of oil. Right now, even without the subsidy, corn ethanol is a viable enterprise.

Mr. MORAN. Yes, sir.

Mr. BURKE. Let me comment or respond. I think that woody biomass should be a player in this. Without it, we are unlikely to meet the goals for the standard. Unlike corn, the feedstocks that come from the forest are different and in many instances locally unique. And therefore the local supply means that they will be readily available where they are needed, and we need a definition to permit and incentivize those locally available woody biomasses to feed into this important renewable energy.

I don't think it is an either/or. I think it is a both, and we have to step up and provide it.

Ms. WONG. And furthermore on that note, it already has an infrastructure. Woody biomass has been used. There are roads. There are facilities that can be converted. There are co-location type technologies that you can use. So woody biomass has that incentive as well.

Mr. MORAN. Okay.

Dr. MCDILL. Can I say something?

Mr. MORAN. Yes, sir.

Dr. MCDILL. The potential for woody biomass, I believe, is much greater than for corn. I think with corn we are already hitting some limits because corn, first of all, competes with food. So it drives up the cost of food. Also corn requires relatively good quality soils whereas woody biomass or cellulosic biomass from say switchgrass can be grown on much lower quality types of lands.

And so I believe in 10 years we will be producing a lot more ethanol from cellulose than we will from corn because of the—we will be able to scale it up a lot further than we can corn.

Mr. MORAN. As you all know, two states, particularly the Texas Governor has requested an alteration, a moratorium, on the Renewable Fuel Standard. If the EPA, which has now put this issue—they delayed an answer to this issue. If EPA would decide to do that, are there consequences to the development of new technologies? One of the arguments I would hope that EPA takes into account that an alteration of that Renewable Fuel Standard probably reduces the likelihood that we move in different directions, new directions, the woody biomass cellulosic. Is there not a consequence to a different generation of ethanol in changing that standard?

Mr. GRANT. Congressman, if I could quickly comment. I would tell you that without equivocation on the part of the Administration in administering previously past laws that would have given a loan guarantee to Iogen, we would have ground broken in Idaho on an Iogen facility today.

So that directly relates to your RFS question. Yes, equivocation on the RFS will serve to shuffle capital away from investment in this technology. We very much believe that.

The CHAIRMAN. The gentlewoman from South Dakota.

Ms. HERSETH SANDLIN. Thank you, Mr. Chairman. I thank all of you for your written testimony and your testimony here today and answering so many questions. I have a number of questions that I know I won't have time to get through, but I will submit to you in writing for the record if you could get back to me.

But I do want to pursue an area, Dr. Cassman, as it relates to the potential of American agriculture as it relates to reducing greenhouse gases and carbon sequestration. Your written testimony states that with respect to each biofuel crop, research is needed at the production scale to evaluate the effect of the feedstock crop production system on fluorocarbon sequestration. And it also suggests that a key question in determining whether switchgrass promises greater direct effect greenhouse gas emissions reduction in corn ethanol is whether the switchgrass could sequester greater amounts of carbon.

So if you could please describe for the Subcommittee in greater detail the state of the science on fluorocarbon sequestration and what is needed for us to accurately evaluate the overall role American agriculture producers can play in reducing greenhouse gases through carbon sequestration.

Dr. CASSMAN. Well, Congresswoman, you have asked a very important question because the example of carbon sequester is very illustrative of what can happen when you don't have good science in place.

For example, right now on the Chicago Climate Exchange, we are selling carbon credits for farmers who agree to do no-till and continue that practice for some time. But the science upon which that was based was very shaky. It wasn't based on direct measurement. It was based on experiments, long-term experiments that weren't set up to ask that question. And now what we are finding in recent publications and prestigious journals show there is no carbon sequestration with no-till—very interesting. And it is again a consequence of not having done and invested in good, high-quality, production-scale research when you take into account how systems actually operate.

So I see the same thing happening. Now, that doesn't mean that no-till is not a good, favorable practice. There are huge benefits from no-till in terms of impact on wildlife, in terms of water retention, in terms of soil till structure, and in terms of less energy use in the systems. So there are tremendous benefits. But it is not sequestering carbon.

I think the same thing is going to be true for switchgrass. That is when you look at the existing literature, it is all over the place. And it looks to us like it is the fundamental key to whether this system is going to be massively positive in terms of its impact on greenhouse gases.

And we could have the answer for you in 2 to 3 or 4 years if we get cracking, but what I don't see if the commitment to fund research that gets at—that actually measures things. We are relying far too much on models and back-of-the-envelope estimates.

Ms. HERSETH SANDLIN. If I may——

Dr. CASSMAN. Yes.

Ms. HERSETH SANDLIN.—interrupt. Mr. Moran and I have been working with a number of our Agriculture Committee organizations and other membership organizations as it relates to sort of planning for and preparing to comment and influence potential climate change legislation. What role do you see for these agricultural organizations planning? And what can we do as a Subcommittee or full Committee working with the Executive Branch to accelerate and target the type of research to get these accurate measurements that can ensure that American agriculture can be a participant in a carbon cap-and-trade if indeed we adopt that type of system.

Dr. CASSMAN. And that is the key long-term strategic issue here. It is much bigger than biofuels. And the key to me is what the environmental groups have done by bringing in things like indirect land use change is really a benefit long term to agriculture in a sense because it recognizes that high-yield scientific agriculture on existing farmland is the key to preventing indirect land use changes in places like the Amazon.

And so we can start working with them. Say yes, this is common ground. So research should focus on scientific means and documentation, validation, and models. How do we double yields on existing farmland and reduce the environmental impact of agriculture? Ask that single question. Demand that it be done at a production scale, and you have solved the food *versus* fuel issue. You have solved the greenhouse gas issue, and you have put us back on a path to finding answers that will get us forward.

Ms. HERSETH SANDLIN. Thank you very much. Dr. McDill?

Dr. MCDILL. Yes, I just want to say that oftentimes policymakers want and need numbers really quick, and no matter how much money you throw at a research question, when you want numbers really quick, the way they tend to get developed is you pull numbers out of the literature. And so that is exactly what Dr. Cassman was talking about. When you look at a lot of the existing studies, people have taken models and thrown numbers out of the literature, into those models with very little validation that goes on.

Frankly there isn't much substitute for time and long-term study. So that kind of modeling is critically important for getting answers to policymakers really quick, but there is a tendency then, once we have a number, to say okay, we have the number. Let us just move on.

It is also really critical to fund more long-term research to actually look at what is going on on the ground and to do careful measurements and update those numbers and revisit those numbers over time, which almost never gets done.

Ms. WONG. But until you have that information, we already have a feedstock that has been excluded. We have the thinning materials, the restoration materials that are basically being left in the forest or are being burned in fields that are being excluded.

So that information is extremely important, but this definition is already excluding things that we have right now that are low-carbon and low-value.

Ms. HERSETH SANDLIN. Well, my time is up, but, Ms. Wong, I appreciate that comment because it sort of goes to my other area of concern here with what we have done in the short term that hamstrings our efforts. I think we can address both energy security issues, as well as positive environmental issues for the health of our forests; but also for energy diversity with cellulosic biofuels.

So I appreciate your insightful responses to my question, and we look forward to working together with you to work through this issue of carbon sequestration, the type of information we need. But, Ms. Wong, since votes haven't been called and the Chairman is giving me the green light, let me just ask a quick question of you. And you may have answered this already, and I think I know generally where the Institute is in trying to figure a way through where we are now.

Your written testimony notes with regret that the definition of *renewable biomass* included in the 2007 Energy Bill rules several feedstocks ineligible, as you just mentioned, including thinning materials and woody residues from Federal forests, some woody feedstocks from private forests. So as you know I too want to see that definition changed and improved, and I have introduced the legislation to do that. And I am also open to discussion, however, about

how to best accomplish that goal. It is not my bill or nothing. I am open to figuring this out so that my constituents and folks across the country that can benefit both economically and environmentally from developing biomass can do so.

And I guess I am wondering what you see as sort of the key in developing a consensus on improving the definition of *renewable biomass* to widen it to include woody biomass feedstocks that qualify under the RFS. Have you had discussions with other organizations focused on sustainability, focused on other issues important to this definition that you can see that there might be a key or two to developing that consensus separate from what some want just in a regulatory environment and what some of us want as a legislative fix in bills that have already been introduced?

Ms. WONG. That is a very good question. So first of all, I think what this Subcommittee is doing right now is extremely important because it is really highlighting the issue of what the feedstock really is. I can congratulate everyone on that.

It is difficult to say. EESI has been involved or has been leading a dialogue for a year now on bioenergy from forests, and it is very difficult to get consensus around this definition. And I really look forward to working with both you and all the other Members on this definition.

I think what is really key is to really look at the performance of the fuel that we are trying to get at. I think that the arbitrary distinctions are not working, but I don't know if I have really unlocked it yet. So I look forward to talking with you more about that.

Ms. HERSETH SANDLIN. I appreciate that. Yes, Mr. Burke.

Mr. BURKE. Let me offer insight but not necessarily the key. I think the local nature of the forest-based renewable resource is key because it avoids the transportation costs, and that is an important component in finding that key or solution to opening the definition to be more inclusive.

Ms. HERSETH SANDLIN. That is a very good point. Thank you. Thank you all very much. Mr. Chairman, I appreciate it. I yield back.

The CHAIRMAN. I thank the gentlewoman, and the chair thanks the panel for your testimony and your participation today as well as all the Members of the Subcommittee. Under the rules of the Committee, the record of today's hearing will remain open for 10 days to receive additional material and supplementary written responses from witnesses to any question posed by a Member of the panel.

This hearing of the Subcommittee on Conservation, Credit, Energy, and Research is adjourned.

[Whereupon, at 12:15 p.m., the Subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

SUBMITTED LETTER FROM HON. JERRY MORAN, A REPRESENTATIVE IN CONGRESS FROM KANSAS

June 19, 2008

Hon. STEPHEN L. JOHNSON,
Administrator,
U.S. Environmental Protection Agency,
Washington, D.C.

Dear Administrator Johnson:

On April 25, 2008, Texas Governor Rick Perry submitted to the Environmental Protection Agency (EPA) a request for a 50 percent waiver of the 2008 Renewable Fuel Standard (RFS) implemented by the Energy Independence and Security Act of 2007. Although significant challenges face the agriculture and ethanol industry in meeting the goals of the RFS in the future, I ask that you deny Governor Perry's request. A waiver of the RFS in 2008 is premature and unwarranted under existing law.

The Energy Independence and Security Act of 2007, Public Law 110–140, amended section 211(o) of the Clean Air Act to require that gasoline in the United States contain at least 9 billion gallons of renewable fuel in 2008. It also amended section 211(o)(7) to expand the circumstances when the Administrator of EPA may waive the requirements of the RFS. Section 211(o)(7) allows the Administrator to waive the RFS in a given year if the Administrator determines the RFS would "severely harm the economy . . . of a state . . . ."

Governor Perry's request that the RFS "is unnecessarily having a negative impact on Texas' otherwise strong economy" by its own words falls short of the severe harm standard articulated in Clean Air Act. Severe harm was intended to be high threshold. Although it is undeniable the RFS has and will continue to put upward pressure on the price of corn, the conclusion that ethanol is the primary cause of the recent increase in food price is inaccurate. Ethanol production generated by the RFS has helped reduce the price of gasoline by as much as fifteen percent according to a Merrill Lynch analyst and 29¢ to 40¢ per gallon according to an Iowa State University study. The RFS will also serve as a catalyst to encourage production of the next generation of biofuels like cellulosic ethanol.

A significant cause of the increase in food prices is the escalating cost of energy. According to U.S. Department of Agriculture's Economic Research Service (ERS), from 1999 until May 2008, the food commodity index rose 98 percent, while the oil index rose 547 percent. In addition, the weakened U.S. dollar, increased global food demand, global crop production shortages caused by weather related disasters, and protectionist trade polices of other nations have led to worldwide food inflation.

ERS reports that only ⅓ of retail food products use corn as an ingredient. It also states that an increase in the price of corn is passed through to retail food prices at a rate of less than ten percent of the increase in corn price. When this data is considered together, ERS concludes a 50 percent increase in corn prices translates into less than a one percent increase in the price of food above the normal rate of inflation.

The most direct impact of higher corn prices is felt by the fed livestock industry. Kansas is the largest beef producing state and ranks among the top three states in total number of cattle on feed. Kansas also ranks in the top ten states in hog production. The livestock industry is as important to Kansas as it is to Texas.

The challenges faced by the livestock industry will continue in the subsequent years as the demand for corn-based ethanol increases. The ethanol industry must be kept viable, but as the need for corn-based ethanol production increases, it will become necessary to find ways to expand corn supply or allow livestock producers to more equitably compete for available corn stocks. I urge you to work with the Secretary of Agriculture to find solutions to these emerging issues.

Although challenges remain, the RFS should be allowed to function in 2008. On balance, the negative impacts referenced by Governor Perry do not rise to the level of severe harm. In addition, the negative impacts from waiver of the RFS mid-way through the year could have an adverse affect on many ethanol plants that have made yearly operating plans based on the 2008 RFS levels. A waiver of the RFS not only risks retraction of the corn-based ethanol industry, but could stifle research and development in cellulosic ethanol technology. This would be unfortunate, as cellulosic ethanol may enable the biofuel industry to less actively compete against livestock producers for feedstock.

Thank you for considering my comments and please let me know if I can be of assistance as you make your decision.

Very truly yours,

Hon. JERRY MORAN,
Member of Congress.

SUBMITTED STATEMENT OF BART RUTH, MEMBER, 25X'25 NATIONAL STEERING COMMITTEE

The 25x′25 Steering Committee would like to thank the Subcommittee for holding a hearing on producer eligibility for farm bill energy title programs and the implementation of the Renewable Fuel Standard (RFS).

Over the last year, opportunities for farmers, ranchers, and foresters to participate in domestic energy production have increased significantly as result of the passage of the Energy Security and Independence Act of 2007 (EISA) and the 2008 Farm Bill. The newly established Biomass Crop Assistance program (BCAP) will help producers' transition to dedicated energy crop production however, to be effective, authorized funding for establishing, harvesting, collecting and transporting biomass must be provided.

In addition, a major funding gap remains for research, development, and deployment for dedicated energy crops and their conversion to bioenergy on a commercial scale. While a recent Environmental and Energy Study Institute (EESI)'s survey shows 22 commercial-scale cellulosic biorefineries being planned, with projected operating ability in the 2009–2010 time period,[1] Federal assistance to producers and refiners who plan to move advanced biofuels from pilot stage to commercial scale production is critically needed. We urge this Subcommittee to communicate it support for expanded Federal bioenergy education, research, and deployment funding to appropriate Congressional Appropriation Subcommittees.

As you know, EISA and the farm bill contain different definitions of *biomass* eligible for funding under the two laws. While the Energy Title of the 2008 Farm Bill included biomass from Federal forestlands in the definition for eligible sources, EISA excludes woody biomass from Federal forestlands and naturally grown forests from its definition of *renewable biomass* thus rendering these sources of biomass ineligible for EISA-funded programs. Considering that a third of America's land base is forested, and nearly 60 percent is held by private nonindustrial landowners, this restriction basically undermines the ability of the forestry sector to participate in biomass energy conversion projects and contribute to the nation's energy needs.

The narrow scope of the definition eliminates important economic incentives for forest owners and forestland managers to thin and remove hazardous fuel accumulations. A more inclusive definition of *renewable biomass* which allows the thinning and removal of hazardous fuel loads will reduce wildfire occurrences as well as the related costs to Federal and state governments for fighting and controlling wildfires. At the same time, it will reduce significant greenhouse gas emissions resulting from catastrophic wildfires such as those occurring this summer in California. The definition, as it now stands, also excludes potential markets and removes viable economic options for private forest landowners and public land managers who have acreages in need of thinning and other forest management treatments that could improve the health, productivity, and sustainability of our nation's forestlands.

We would like to thank Congresswoman Herseth Sandlin for leading the effort on this issue, and we strongly urge Congress to pass a bill that would correct the woody biomass definition this year.

The issue of woody biomass eligibility is also critical when Congress addresses climate change legislation. The agriculture and forestry sectors can and do play a major role in reducing greenhouse gas emissions and sequestering carbon. An expanded definition of *renewable biomass* along with adequate incentives will ensure that our nation's forest and agricultural lands contribute their full potential towards the reduction of harmful greenhouse gases.

The 25x′25 Alliance believes that to be a long-term solution for America renewable energy production must conserve, enhance and protect natural resources and be economically viable, environmentally sound and socially acceptable. Earlier this year, we worked with a broad cross-section of 25x′25 partners and developed a set of Sustainability Principles for a 25x′25 Energy Future. These principles were subsequently adopted by the 25x′25 National Steering Committee which recommended

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[1] *Cellulosic Biofuels Factsheet,* Environmental and Energy Study Institute, 2008 *http://www.eesi.org/publications/Fact%20Sheets/eesi__cellethanol__factsheet__072308.pdf.*

their adoption by renewable energy producers and policy makers. A copy of these principles are attached to this statement.

In closing, we hope that the U.S. Congress will pass a technical corrections bill before the end of the year that will establish a broader definition for *renewable biomass* eligible for participation in Federal renewable energy programs. Thank you for the opportunity to submit this statement. We would be happy to respond to any questions.

ATTACHMENT

25x'25 Sustainability Principles

March 2008

In September of 2007, the 25x'25 Steering Committee chartered a work group composed of a cross section of agricultural, forestry, industry, environmental and conservation leaders to help further define sustainability in a 25x'25 renewable future. The mission of the work group was to develop recommendations for sustainability principles that would help guide the evolution of 25x'25.

The sustainability principles outlined in this report are the product of the 28-member 25x'25 National Steering Committee. Though the assumptions and principles were drawn from the consensus recommendations developed by the work group, they represent the views and position of the 25x'25 National Steering Committee rather than any individual 25x'25 Alliance partner.

Preamble

In the Energy Independence and Security Act passed in December 2007 the U.S. Congress formally adopted 25x'25 as a national goal, affirming that it is the goal of the United States to derive 25 percent of its energy use from agricultural, forestry and other renewable resources by 2025.

The 25x'25 Action Plan *Charting America's Energy Future,* authored and released by the 25x'25 National Steering Committee in February 2007, outlines specific steps that need to be taken to put the United States on a path to secure 25 percent of its energy needs from renewables by the year 2025. The 25x'25 goal and Action Plan stand on a foundation of five key principles—efficiency, partnership, commitment, sustainability, and opportunity.

Sustainability has always been considered as central to the success of the 25x'25 renewable energy initiative and is defined as follows in the Action Plan:

> *Sustainability—To be a long-term solution for America, renewable energy production must conserve, enhance, and protect natural resources and be economically viable, environmentally sound, and socially acceptable.*

Underpinning the concept of sustainability is the ideal of stewardship or the responsible use and orderly development of natural resources in a way that takes full and balanced account of the interests of society, future generations, and other species, as well as private needs, and accepts significant answerability to society.

In developing these principles, a number of basic underlying assumptions were identified and agreed to:

- Renewable energy production must comply with all existing federal, state, and local laws and regulations.
- All regions will have an opportunity to engage in the production of bioenergy feedstocks and renewable energy.
- Renewable energy production should address the multiple-values of the landbase including environmental, economic, social, and historical.
- Balance of stakeholder interests must be a central theme in renewable energy production.
- The principles set forth for sustainability are mutually reinforcing.

The 25x'25 National Steering Committee recommends the following principles to 25x'25 partners and would support their adoption by renewable energy producers and policy makers.

Access:

Renewable energy producers and consumers should have fair and equitable access to renewable energy markets, products, and infrastructure.

Air Quality:

Renewable energy production should maintain or improve air quality.

Biodiversity:

Renewable energy production should maintain or enhance landscape biodiversity and protect native, rare, threatened, and endangered species and habitat.

Community Economic Benefits:

Renewable energy production should bolster the economic foundation and quality of life in communities where it occurs.

Efficiency and Conservation:

Renewable energy production should be energy efficient, utilize biomass residues and waste materials when possible, and conserve natural resources at all stages of production, harvesting, and processing.

Greenhouse Gas Emissions:

Renewable energy production should result in a net reduction of greenhouse gas emissions when compared to fossil fuels.

Invasive and Non-Native Species:

Introduced or non-native species can be used for renewable energy production when there are appropriate safeguards against negative impacts on native flora and fauna, and on agricultural and forestry enterprises.

Market Parity:

Renewable energy production should have parity with fossil fuels in access to markets and incentives.

Opportunities:

All regions of the nation should have the opportunity to participate in renewable energy development and use.

Private Lands:

Renewable energy production on private working farm, forest, and grasslands should improve the health and productivity of these lands and help protect them from being permanently converted to non-working uses.

Public Lands:

Renewable energy production from appropriate public lands should be sustainable and contribute to the long-term health and mission of the land.

Soil Erosion:

Renewable energy production should incorporate the best available technologies and management practices to protect soils from loss rates greater than can be replenished.

Soil Quality:

Renewable energy production should maintain or enhance soil resources and the capacity of working lands to produce food, feed, fiber, and associated environmental services and benefits.

Special Areas:

Renewable energy production should respect special areas of important conservation, historic, and social value.

Technology:

New technologies, including approved biotechnology, can play a significant role in renewable energy production, provided they create land use and production efficiencies and protect food, feed, and fiber systems, native flora and fauna, and other environmental values.

Water Quality:

Renewable energy production should maintain or improve water quality.

Water Quantity:

Renewable energy production systems and facilities should maximize water conservation, avoid contributing to downstream flooding, and protect water resources.

Wildlife:

Renewable energy production should maintain or enhance wildlife habitat health and productivity.

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25x'25 National Steering Committee

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SUBMITTED STATEMENT BY WILLIAM IMBERGAMO, DIRECTOR, FOREST POLICY, AMERICAN FOREST & PAPER ASSOCIATION

The American Forest & Paper Association (AF&PA) appreciates the opportunity to share our perspective on the Renewable Fuel Standard (RFS) that was enacted as part of P.L. 110–140, the Energy Security and Independence Act of 2007.

AF&PA is the national trade association of the forest, pulp, paper, paperboard, and wood products industry. The industry accounts for approximately six percent of the total U.S. manufacturing output, employs more than a million people, and ranks among the top 10 manufacturing employers in 42 states with an estimated payroll exceeding $50 billion. We support policy efforts to increase our nation's energy security and our member companies are leading the effort to achieve this objective by combining advanced technology and innovative manufacturing practices with responsible stewardship of our natural resources.

The forest products industry is a leader in the generation and use of renewable energy from biomass residue in our mills. Sixty-four percent of the energy used at AF&PA member pulp and paper mills, and 74 percent of the energy from our wood products facilities, is generated from carbon-neutral biomass. Forest product facili-

ties account for 82 percent of the total biomass energy generated by all industries collectively.

Our renewable energy use and production is accomplished while adhering to disciplined market-based standards of accountability that ensure the wood fiber we use is grown in a sustainable manner. Since 1995, all AF&PA members must subscribe to the principles of the Sustainable Forestry Initiative® (SFI®), which sets rigorous forest management standards that are reviewed by external partners from conservation groups and research organizations. With over 226 program participants and 156 million acres of certified well managed forests, the SFI® program ensures that America's forest and paper companies are committed to sustainable management. Our historic commitment to renewable energy and sustainable forest management demonstrates that a balance between the two is both possible and necessary.

AF&PA urges Congress to modify the definition of *renewable biomass* in the RFS provision of P.L. 110–140, which currently restricts eligibility based on forest types and successional stage and disqualifies most fiber from public ownerships. We also recommend adding criteria to the waiver provision that will help balance the resource needs of existing biomass users, the emerging resource needs of the cellulosic biofuels industry, and the health, viability, and productivity of our agricultural and forestlands throughout the country.

The definition of *renewable biomass* in the RFS statute creates a number of implementation challenges and would meaningfully reduce landowner options and raise fiber costs for manufacturers of paper and wood products. We urge Congress to revisit this issue and replace the existing definition of *renewable biomass* with the definition contained in Section 102(4) from the version of H.R. 6, the Energy Security and Independence Act that passed the Senate on June 21, 2007.

As written, the definitional approach in P.L. 110–140 regarding tree plantations established prior to enactment potentially excludes large swaths of timberland and provides a disincentive to prospective market entrants who wish to grow new forests. This language also excludes materials from forests in the Lake States, northern New England, Central Appalachians, and other regions that are managed to allow natural tree regrowth, with potentially negative effects on jobs and economic growth in these already distressed rural areas. In addition, the *renewable biomass* definition in the RFS encourages would-be producers of renewable fuel to focus their procurement efforts on existing softwood plantations, which are already intensively managed and supply the raw material for existing wood fiber-based manufacturing.

Second, the prohibition on the use of "slash and thinnings" from either old growth or forests on any list of imperiled forests is unworkable because of numerous technical ambiguities that make it difficult, if not impossible, to map and apply. We are concerned the prohibition in practice will either exclude large amounts of wood fiber out of confusion or an abundance of caution, or be enforced entirely in the breech because of difficulties verifying the source of the generally low value fiber being used to produce biofuels. In any event, landowner decisions regarding harvest are driven primarily by regional market dynamics which make harvesting old growth timber to produce low-value biomass impractical.

Third, the exclusion of fiber from public lands prevents the utilization of low value materials removed from the forest to reduce fire risk and improve forest health. There are over 90 million acres of Federal public lands that are at high risk of uncharacteristic fire, insect, or disease outbreaks. Eliminating the biofuels market as a tool to reduce hazardous fuel loads will exacerbate the decline in infrastructure needed to do this work, placing both forests and adjacent communities at increased risk.

In addition to definitional modifications, AF&PA urges Congress to further amend the RFS by adding language that would clarify that a state's petition for a waiver from the RFS mandate should be granted if compliance with the mandate would severely harm the long-term agricultural and silvicultural capability of a region of the country. Clarifying that a waiver should be granted if mandated production levels threaten the ability of natural resources in the state or region to satisfy production levels, in addition to meeting demand from existing biomass feedstock users that rely on the same resource to produce food and manufacture products, would improve the standard. Enhancing the waiver will help maintain a working balance between the resource needs of existing biomass users and the emerging resource needs of the cellulosic biofuels industry. The modification would also help preserve the health, viability, and productivity of our agricultural and forestlands throughout the country, as well as economies in rural areas.

The forest products industry is a leader in developing innovative energy solutions that decrease our reliance on fossil fuel and is the largest producer of biomass energy in the country. We urge Congress to assist our efforts by supporting an unbiased definition of *renewable biomass*, ensuring the long-term silvicultural and agri-

cultural capability of regions, and maintaining the current biomass needs of existing facilities.

We thank the Committee for creating an opportunity to comment on this important issue and look forward to working with you and others in Congress in the coming months to craft a workable and balanced renewable energy policy.

For more information please contact:

ELIZABETH VANDERSARL,
Vice President, Government Affairs,
American Forest & Paper Association.

SUBMITTED LETTER AND STATEMENT OF JOSEPH JOBE, CEO, NATIONAL BIODIESEL BOARD

July 24, 2008

Hon. TIM HOLDEN,
Chairman,
Subcommittee on Conservation, Credit, Energy, and Research,
Committee on Agriculture,
Washington, D.C.;

Hon. FRANK D. LUCAS,
Ranking Minority Member,
Subcommittee on Conservation, Credit, Energy, and Research,
Committee on Agriculture,
Washington, D.C.

RE: Subcommittee Hearing to Review Renewable Fuel Standard Implementation and Agriculture Producer Eligibility.

Dear Chairman Holden and Ranking Member Lucas:

The National Biodiesel Board (NBB) applauds you for your continued leadership on renewable fuels and for holding this hearing today. The NBB is the trade association for the U.S. biodiesel industry and represents 171 biodiesel producers across the United States.

As an industry, we wanted to make sure the Subcommittee was aware of an issue that is of critical importance to the ultimate success of the Renewable Fuel Standard (RFS) and our nation's efforts to reduce our dependence on foreign oil. Specifically, we are concerned that the Environmental Protection Agency (EPA) will not require the domestic use of 500 million gallons of biodiesel or biomass-based diesel as mandated by the Energy Independence and Security Act of 2007 (EISA) in 2009. The bipartisan EISA enacted in December, 2007, significantly improved the RFS and included a requirement to use 500 million gallons of biomass-based diesel in the United States in 2009. This requirement gradually increases to 1 billion gallons by 2012. Biodiesel is one of the fuels available in the marketplace today that will qualify as a biomass-based diesel. It is imperative that the EPA require the use of 500 million gallons of biomass-based diesel be used domestically in 2009.

Already, in 2008 the industry is expected to exceed the 500 million gallons required by the RFS in 2009 and under the existing RFS, the EPA has a system in place to track biodiesel in the marketplace through its "renewable identification numbers" (RINs). In our view, EPA should use this existing system to implement the biomass-based diesel use requirements as mandated under current law.

To help meet the nation's larger policy goals as it relates to energy security, climate change and economic development, it is vital that EPA move forward with creating the domestic requirement to use 500 million gallons of biomass-based diesel in 2009, consistent with current law under EISA and the RFS.

The NBB looks forward to working constructively with both Congress and the EPA to meet the RFS requirements established in EISA. We appreciate your continued leadership and support of efforts to promote the production and use of biodiesel.

Sincerely,

JOSEPH JOBE,
Chief Executive Officer,
National Biodiesel Board.

SUBMMITED STATEMENT

Chairman Holden, Ranking Member Lucas and Members of the Subcommittee, the National Biodiesel Board (NBB) applauds you for your continued leadership on renewable fuels and for holding this hearing today. We appreciate the opportunity to submit written testimony concerning the implementation of the updated Renewable Fuel Standard (RFS2) which the industry supports and has pledged to help implement.

As an industry, we wanted to make sure the Subcommittee was aware of an issue that is of critical importance to the ultimate success of the Renewable Fuel Standard (RFS) and our nation's efforts to reduce our dependence on foreign oil. Specifically, we are concerned that the Environmental Protection Agency (EPA) will not require the domestic use of 500 million gallons of biodiesel or biomass-based diesel as mandated by the Energy Independence and Security Act of 2007 (EISA) in 2009. The bipartisan EISA enacted in December, 2007, significantly improved the RFS and included a requirement to use 500 million gallons of biomass-based diesel in the United States in 2009. This requirement gradually increases to 1 billion gallons by 2012. Biodiesel is one of the fuels available in the marketplace today that will qualify as a biomass-based diesel. It is imperative that the EPA require the use of 500 million gallons of biomass-based diesel be used domestically in 2009.

About NBB: The National Biodiesel Board (NBB) is the national trade association representing the biodiesel industry as the coordinating body for research and development in the United States. It was founded in 1992 by state soybean commodity groups who were funding biodiesel research and development programs. Since that time, the NBB has developed into a comprehensive industry association which coordinates and interacts with a broad range of cooperators, including industry, government and academia. NBB's membership is comprised of state, national and international feedstock and feedstock processor organizations, biodiesel suppliers, fuel marketers and distributors and technology providers.

Background and Industry Overview: Biodiesel is a diesel fuel replacement that is made from agricultural oils, fats and waste greases that meets a specific commercial fuel definition and specification. The fuel is produced by reacting feedstock with an alcohol to remove the glycerin in order to meet specifications set forth by the American Society for Testing and Materials (ASTM International). Biodiesel is one of the best-tested alternative fuels in the country and the only alternative fuel to meet all of the testing requirements of the 1990 amendments to the Clean Air Act.

Biodiesel is primarily marketed as a blended product with conventional diesel fuel, typically in concentrations up to 20%. It is distributed utilizing the exiting fuel distribution infrastructure with blending most commonly occurring "below the rack" by fuel jobbers. Biodiesel is beginning to be distributed through the petroleum terminal system. To date, biodiesel has positions in approximately 42 terminals. The biodiesel industry has already committed funds to study the technical needs required for moving biodiesel through U.S. pipelines. Already, biodiesel is moved through pipelines in Europe and extending that capability in the U.S. would significantly increase biodiesel penetration in the U.S. diesel fuel market.

The biodiesel industry has shown steady growth over the last 15 years. In 2007, the industry produced 500 million gallons of biodiesel and is on pace to increase production above these levels in 2008. Today, there are 171 plants in operation with the capacity to produce more than 2.24 billion gallons of biodiesel and 60 new plants under construction or expansion, which will add an estimated new capacity of nearly 1.13 billion gallons.

Industry Position on RFS2 Implementation: The bipartisan Energy Independence and Security Act of 2007 (EISA), enacted in December, 2007, significantly improved the original RFS and included a requirement to use 500 million gallons of biomass-based diesel in the United States in 2009. This requirement gradually increases to 1 billion gallons by 2012. Biodiesel is one of the fuels available in the marketplace today that will qualify as a biomass-based diesel. Consistent with existing statute as established in EISA, it is imperative that the Environmental Protection Agency (EPA) require the use of 500 million gallons of biomass-based diesel in 2009.

For the NBB, the most important issue or concern relating to implementation of RFS2 is ensuring that the EPA complies with the statutory requirement to mandate the domestic use of 500 million gallons of biomass-based diesel in 2009. While we applaud the EPA for diligently moving forward on implementing the rule, the biodiesel industry is concerned that EPA will not be prepared to issue a final rule prior to January 1, 2009, which may delay implementation of the biomass-based diesel usage requirement.

The U.S. biodiesel industry is fully capable of meeting the RFS biomass-based diesel requirements. U.S. biodiesel production in 2008 is expected to exceed the 500 million gallons required by the RFS in 2009.

Under the existing RFS, the EPA tracks the amount of biodiesel used in the marketplace via "renewable identification numbers" (RINs) and in our view, EPA has the ability to use this existing system to implement the biomass-based diesel use requirements as mandated under current law. It is vital that EPA move forward with implementing the domestic requirement to use 500 million gallons of biomass-based diesel in 2009 to help meet the nation's larger policy goals relating to energy security, climate change and economic development.

There is precedent for EPA to require the use of renewables absent the issuance of a final RFS rule. When the initial RFS was enacted as part of the Energy Policy Act of 2005, EPA required the use of a minimal amount of renewable fuels in the marketplace prior to promulgation of a final rule implementing the RFS. Specifically, it required the use of 4.0 billion gallons in 2006 with no rule or tracking system in place. Also, in 2007, 4.7 billion gallons were required, even though the regulatory rule did not take effect until September 1, 2007. Given the presence of the existing tracking system, the EPA has both the mechanisms and the precedent to move forward with requiring the use of 500 million gallons of biomass-based diesel absent the promulgation of a final RFS2 rule.

Implementation of the 500 million gallon use requirement for biomass-based diesel in 2009 absent promulgation of a final rule implementing RFS2 is consistent with EISA's greenhouse gas reduction goals. The most recent USDA–DOE lifecycle study shows a 78% reduction in lifecycle CO_2 emissions for biodiesel. Already, we know that using 500 million gallons of biodiesel in the United States will reduce current lifecycle greenhouse gas emissions by 8.06 billion pounds, the equivalent of removing 700,000 passenger vehicles from our highways.

We are concerned that if EPA does not direct obligated parties to use biomass-based diesel, then the entire amount of renewable fuels required in 2009 (11.1 billion gallons) will be filled by ethanol. Already, the ethanol industry has more than 9.4 billion gallons of capacity with more than 4.2 billion gallons coming online in the next 18 months. Today, ethanol is blended into more than 50% of the gasoline marketplace nationwide and new infrastructure is rapidly being established in the Southeast, where an estimated 2 billion new gallons of ethanol is already entering the marketplace. In our view, the overwhelming volume, the mature infrastructure, and the economics of today's market will lead obligated parties to choose ethanol, rather than any other fuel, to meet 2009 requirements under the RFS2. This is inconsistent with the goal of RFS2 to diversify the use of renewable fuels in the U.S. and for the first time implement a low-carbon renewable requirement for U.S. diesel fuel.

Therefore, NBB recommends that after January 1, 2009 and until the final regulatory rule required by the EISA is promulgated, that the Administrator of the EPA include a specific actual volume for "biomass-based diesel" consistent with Section 202 of EISA. Furthermore, we encourage the Administrator to utilize EPA's existing authority to implement the biomass-based diesel schedule consistent with RFS2.

Biomass-Based Diesel RFS2 Requirement Has Minimal Impact of Food Prices: As both the U.S. Department of Agriculture (USDA) and the U.S. Department of Energy (DOE) have noted, biofuels-related feedstock demand plays only a small role in global food supply and pricing. Worldwide, the estimated increase in the price of soybeans and soybean oil would increase the global food commodity price index by 1–2 percent. In the U.S., according to USDA and DoE, food prices have increased by about 4.8 percent. Of that increase, ethanol and biodiesel consumption accounted for only four or five percent while other factors accounted for 95–96 percent of the increase.

The combination of rising energy costs, increased global commodity demand, and the weak dollar are the main causes of rising food prices. It is important to note that U.S. biodiesel production is **not** a significant factor of soybean usage either in the United States or worldwide. In 2007, only 12% of U.S. soybean production and 4% of global soybean production was used by the U.S. biodiesel industry to produce fuel. Furthermore, from the soybeans used to produce biodiesel, 81% of the soybean's yield is protein that enters the market for either human consumption or animal feed.

Concern has been raised regarding the impact of RFS2 on corn or feed prices. Again, the true causes of rising food prices are energy costs, global commodity demand, and the weak dollar. With that said, it is also important to again note that biodiesel is made from agricultural oils, fats and waste greases, not made from corn. Thus, the production of biodiesel has no direct impact on corn prices. Corn and soybeans compete for acreage in the United States and weather will play a role in pro-

duction numbers for both crops; however, according to USDA's most recent *World Agricultural Supply and Demand Estimates,* global oilseed production is projected to increase to nearly 420 million tons for 2008/09, an increase of 31.6 million tons from 2007/08.

Soybeans are currently the primary oilseed crop grown in the United States, and soybean oil makes up about 60 percent of the raw material available to make biodiesel. The other 40 percent consists of all other vegetable oils and animal fats. Specifically, in 2007, refined soybean oil, made up 62.74%; crude soybean oil, made up 16.64%; animal fats and oils, made up 16.05%; inedible tallow and grease, made up 4.36% and cottonseed oil, made up .021%.

As this demonstrates, U.S. biodiesel is produced from a variety of diverse feedstocks. Looking forward, it is apparent that the feedstock needed to meet the biomass-based diesel requirements in RFS2 will be readily available and U.S. biodiesel production will continue to have an insignificant impact on food prices.

Technological advances and plant science research are adding "virtual acres" for greater production from existing cropland. In July, 2007 Monsanto announced plans to introduce new technology in 2009 that can increase yields by as much as 9% to 11%. In September, 2007 DuPont announced it is commercializing soybean varieties that increase yields by as much as 12%. If 90% of U.S. soybean acres adopted the new technology, more than 60 million acres could benefit from a 10% increase in yield. This potentially equates to more than 250 million additional bushels of soybeans (the equivalent of 380 million gallons of biodiesel).

Other sources of biodiesel feedstock, such as restaurant grease and animal fats are increasingly being used in biodiesel production. In addition, corn oil derived from ethanol production, camelina, and algae are currently being developed and utilized. According to the National Energy Research Laboratory (NREL), in Golden Colorado (March 2006), current feedstocks for biodiesel total nearly 2.0 billion gallons (including greases, animal fats, and vegetable oils). NREL anticipates the natural growth and expansion of existing feedstocks (soy, canola, and sunflowers) will expand feedstocks supplies for an additional 1.8 billion gallons by 2016.

It is clear that the feedstock needed to meet the conservative biomass-based diesel schedule established in RFS2 will be readily available, and any minor increases in food prices that could result will be more than offset by the public policy benefits that are achieved by addressing the nation's energy security, climate change and economic development objectives.

Conclusion:

We appreciate the opportunity to provide written comments for this important hearing and we look forward to working with you to improve our nation's energy balance, its environmental stewardship and the creation of new green jobs across the United States.

If the EPA implements RFS2 as required by statute, it will provide the greatest opportunity for this nation to decrease its dependence on imported oil, increase domestic employment opportunities and decrease greenhouse gas emissions through transportation's fuels.

For the NBB, the most important issue or concern relating to implementation of RFS2 is ensuring that the EPA complies with the statutory requirement to require the domestic use of 500 million gallons of biomass-based diesel in 2009.

Finally, the U.S. biodiesel industry is fully capable of meeting the RFS biomass-based diesel requirements and in a manner that will have little if any impact on food prices because the industry utilizes an abundant, increasingly diversified pool of feedstocks to produce the most sustainable fuel used in transportation fuels today.

SUBMITTED STATEMENT OF HON. M. MICHAEL ROUNDS, GOVERNOR, STATE OF SOUTH DAKOTA; CHAIRMAN, MIDWESTERN GOVERNORS ASSOCIATION

I would like to thank Chairman Holden and Ranking Member Lucas of the Subcommittee on Conservation, Credit, Energy, and Research of the House Committee on Agriculture for holding this hearing on the renewable fuels and eligibility, as well as affording me the ability to provide this statement for the record.

As Governor of the great state of South Dakota, I provide the following remarks on behalf of the Midwestern Governors Association (MGA), of which I am Chair. The panels of witnesses assembled here today have helped to provide a voice in response to the negative image that some are attempting to place on biofuels. I hope that my testimony, in conjunction with the others heard here, will help dispel many negative stereotypes associated with ethanol.

The MGA is a nonprofit, nonpartisan organization that brings together the governors of 12 states to work cooperatively on public policy issues of significance to the midwestern region. In addition to myself and the state of South Dakota, the current members of the MGA are Gov. Rod Blagojevich (Ill.), Gov. Mitch Daniels (Ind.), Gov. Chet Culver (Iowa), Gov. Kathleen Sebelius (Kansas), Gov. Jennifer Granholm (Mich.), Gov. Tim Pawlenty (Minn.), Gov. Matt Blunt (Mo.), Gov. Dave Heineman (Neb.), Gov. John Hoeven (N.D.), Gov. Ted Strickland (Ohio) and Gov. Jim Doyle (Wis.).

The states have long been leaders in recognizing the benefits of strong renewable and domestic sources of energy. This recognition has turned to action in the Midwest for support of ethanol (including the development and deployment of cellulosic biofuels), wind, woody biomass, advanced coal with carbon capture and sequestration, and anaerobic digesters. Support for these sources of bio and renewable energy, as well as support for the Renewable Fuel Standard (RFS), are key ways to move our country to reach our goal, the goal of yielding a clean, sustainable, domestic source of energy.

One of the ways the Federal Government has played a role in supporting the states in their actions to encourage new energy sources is through the enactment of the RFS. Unfortunately, the negative public relations campaign against renewable energy sources has caused the RFS to come under criticism. This critique has led many to call for the RFS to be repealed, waived or weakened. The benefits of the RFS need to be stressed to the public, who are currently being barraged by the campaign to halt this support of biofuels. Through the RFS, the increased use of renewable fuels will reduce traditional car pollutants, such as benzene and carbon monoxide. Additionally, the RFS also helps to move the ethanol industry towards the use of cellulosic materials and other second and third generation biofuels.

Some criticism for the RFS, however, is warranted and has been a focus in today's hearing. While the field of renewable energy sources, options and techniques are growing, many of these new sources are not counted towards the RFS. We strongly feel that there are a host of energy options that the should be explored, implemented and utilized to meet the current and future energy needs of this nation and the world. Similarly, each region of our nation has varied resources and capabilities to explore these varied energy sources. The U.S. Congress needs to closely examine Federal regulations to ensure that they are not inadvertently stifling renewable energy production.

While we do not debate that there may be a correlation between food prices and the use of biofuels, we do contend that it is neither the only nor the major factor for the increase in commodity prices. There is a myriad of reasons for the increase in all commodities, not just corn. These factors include rising transportation costs due to record oil prices, increased demand for grains and meat from developing countries, increased speculator investment and influence in all commodities markets, and extended global draught. Placing blame on the biofuel industry is misguided and needs to be corrected.

The economic implications of bio and renewable fuels are significant to the Midwest. The growth of biofuels have provided an avenue for rural revitalization and job opportunities for local residents. Our region, as well as other states, have seen a significant growth in the quality of living for those living in rural areas. At a time where there is population migration away from the rural areas, energy industry job opportunities for rural residents will be instrumental in drawing people back to the less-populated areas of the states. This new source of vitality for historically underserved communities is imperative to our nation's place in a global market—as well as ensuring all Americans are afforded the same opportunities and quality of living of those living in urban and suburban areas.

Our nation has become a global economic superpower and leader in the markets due in part to our entrepreneurial spirit. From the telegraph to Silicon Valley, the combine to the transcontinental railway, our country has made giant leaps from the ground to the moon in developing and implementing new technologies. Our entrepreneurial spirit is continuing on with research and expansion of the renewable energy and fuels markets. Advancing from first generation to second, and even third generation biofuels hinges on the support and encouragement of the industries we have in place now. Placing undue criticism and blame on ethanol for price increases in the food or energy markets will only stunt our country's ability to have a clean, sustainable and domestic energy future.

This hearing you held provided excellent information for the record to discount many of the negative perceptions that many are beginning to hear about the biofuel industry. Without a response and attempt to answer some of the misinformation, the future development of second and third generation biofuels may be jeopardized.

Thank you again for allowing me the ability to provide these remarks for the record. The Midwestern Governors Association and myself look forward to being of any assistance we can as you continue to discuss this important topic.

SUBMITTED LETTER OF CONSORTIUM OF AGRICULTURAL SOILS MITIGATION OF GREENHOUSE GASES

Thursday, July 31, 2008

Hon. COLLIN C. PETERSON,
Chairman,
Committee on Agriculture,
Washington, D.C.;

Hon. FRANK D. LUCAS,
Ranking Minority Member,
Committee on Agriculture,
Washington, D.C.

Dear Chairman Peterson and Ranking Member Goodlatte:

We are writing to you to correct the record on a very important matter that is of relevance not only to the agricultural sector but also to the U.S. Congress and to our nation. The issue pertains to the ability of soils—our greatest and most vital natural resource—to absorb carbon dioxide from the atmosphere. This tendency is referred to as soil carbon sequestration, and is a form of biological or terrestrial sequestration that has been identified by many economists, climatologists, and soil scientists as one of, if not the primary, low-cost, high-impact near-term technologies at our disposal to help to begin to reduce U.S. and global emissions of greenhouse gases as we attempt to combat climate change. Agricultural soil sequestration can provide a bridge to a lower-carbon intensive future, by providing valuable emissions reductions and therefore allowing time for the more costly infrastructure changes and capitol stock turnover to occur in the early years of a national policy to reduce greenhouse gas emissions (GHG).

We are all members of a consortium of scientists from land-grant universities and national laboratories created by Congress in 2001 to focus on research and outreach programs related to agricultural soil sequestration, along with agricultural nitrous oxide and methane mitigation efforts in the U.S. The Consortium of Agricultural Soils Mitigation of Greenhouse Gases (CASMGS) has been conducting research on this topic since our formation in 2001, and in most cases, the scientists involved in the Consortium were engaged in research on this topic long before this, as well. The Congress reauthorized CASMGS in the recently enacted 2008 Farm Bill.

At issue is a characterization by some that certain practices such as no-till farming do not increase or otherwise enhance soil carbon stocks by leading to increased soil carbon sequestration. We would like to correct this mischaracterization, and want to assure you that there is an extensive historical and contemporary body of scientific evidence that does in fact show that no-till and minimum-tillage practices, in most instances, lead to increased soil carbon sequestration.

We have attached a brief synopsis reflecting this evidence, and summarizing the state of knowledge relative to no-till and minimum-tillage practices and soil carbon sequestration.

We hope that this information proves useful to your deliberations as you continue to guide and shape the role of the U.S. agricultural sector in the 21st Century, and we hope that you will consider us as a resource for your continued efforts in considering agricultural sustainability and the role of soil carbon sequestration in national climate change policy.

Sincerely,

SUSAN CAPALBO,
Department Head and Professor,
Department of Agricultural and Resource Economics,
Oregon State University;

RICH CONANT,
Research Scientist III,
Natural Resource Ecology Laboratory,
Colorado State University;

R. CÉSAR IZAURRALDE
Laboratory Fellow, Joint Global Change Research Institute,
Adjunct Professor, Department of Geography,

Pacific Northwest National Laboratory and University of Maryland;

KEITH PAUSTIAN,
Professor, Department of Soil and Crop Sciences,
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Colorado State University;

CHUCK RICE,
Professor—Soil Microbiology,
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Kansas State University.

ATTACHMENT

Tillage Effects on Soil Carbon Accumulation

July 31, 2008

Summary:

Data from existing long-term field experiments provides the best source of knowledge about tillage and other production management effects on soil carbon content. The preponderance of this data shows that that adoption of no-tillage increases soil C, relative to conventional tillage, in most U.S. cropland soils.

Background:

Numerous studies of replicated, long-term field experiments comparing conventional tillage (e.g. moldboard plow, chisel, disk) and no-tillage have demonstrated that most soils, following conversion to no-tillage, show an increase in soil carbon (C) content relative to tilled soils, when the measurements are integrated over the full depth of soil affected by tillage (typically the top 20–30 cm) (see reviews by Paustian et al. 1997, West and Post 2002, Ogle et al. 2005). In general, positive soil C responses are obtained first after several years of no-till management (Six et al. 2004) and after 20–30 years, the relative rates of C accumulation tend to decline as soil C levels approach a new equilibrium level under no-till conditions (West and Post 2002). Specific mechanisms by which the physical disturbance from tillage increases soil C loss (and conversely, that reduce soil C loss under no-till) have been proposed and supported by field and experimental evidence (e.g. Six et al. 2000, Denef et al. 2004). On the basis of this experimental evidence, sequestration factors for reduced and no-tillage management have been developed (Ogle et al. 2005) and implemented for inclusion in the Intergovernmental Panel on Climate Change (IPCC) guidelines for national greenhouse gas inventories (IPCC 2006) and values for C credits due to no-till management have been sanctioned by the Chicago Climate Exchange (CCX).

At the same time, it has been long recognized that **not all** soils respond positively in terms of gaining C under no-till—in particular, soils with an already high content of soil C and cropland soils in cool, moist climates often do not show increases in C content under no-till compared to plow tillage; for example, this has been found for several experimental sites in eastern Canada (Anger et al. 1997). The reasons for this lack of response to reduced tillage intensity is not yet clear, although preliminary results suggest that reduced decomposition rates of buried residues under cool, moist climates and 'saturation' of physically-protected soil organic C in high C soils are potential mechanisms (E. Gregorich, personal communication; D. Angers, personal communication). However, the large majority of cropland soils in the U.S. do not fall into this category.

Recently, a few researchers have raised questions about whether no-till, in general, actually leads to a relative increase in soil carbon when viewed at whole soil level, as illustrated in the papers by Baker et al.[1] and Blanco-Canqui and Lal.[2] The foundation of their arguments lay largely in the fact that most measurements of no-till *versus* tillage systems in long-term experiments have often only measured the top 30 cm or less of the soil profile, although several sites have been measured to depths of up to 100 cm. These authors argue that if soil carbon contents are summed to a greater depth of the soil profile (e.g the top 0 to 60 or 100 cm) then in most cases there is no statistically significant difference between different tillage systems. The problem with this argument is two-fold. First, it **is** true that the effects of no-till adoption **are** typically manifested in the top 20–30 cm of soil, which

[1] Baker, J.M., T.E. Ochsner, R.T. Veterea and T.J. Griffis. 2007. *Tillage and soil carbon sequestration: What do we really know?* AGRICULTURE, ECOSYSTEMS AND ENVIRONMENT 118:1–5.

[2] Blanco-Canqui, H. and R. Lal. 2008. *No-tillage and soil-profile carbon sequestration: An on-farm assessment.* SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 72:693–701.

is the zone of soil disturbance in a tilled system! The vast majority of tillage comparisons show no significant differences in soil carbon content below the tillage zone (Ogle et al. 2005).[3] Second, because the change in soil C due to tillage management (the 'signal') is relatively small relative to the 'background' soil C content (the 'noise'), by adding in the additional C stored in lower parts of the profile (even if differences below the plow layer are not significant), this calculation increases the 'noise' in the estimate such that the signal-to-noise ratio decreases and thus it is not surprising that comparisons of C content for the entire soil profile are often not significantly different. A more meaningful determination is to utilize, as far as possible, measurements for different soil depth increments to the full depth of the soil profile and then to evaluate whether soil C contents are different below the tillage zone, and if not, then the estimates should be based on the measurements encompassing the depth of tillage, where the main effects of tillage management are manifested. This is the procedure that has been used in developing the IPCC soil C change factors for tillage management (IPCC, 2006).

Other data that has been used to question whether no-till really increases soil carbon are total ecosystem C flux from eddy covariance measurements (Baker et al. 2007). While eddy covariance (EC) techniques are a highly useful approach in C cycling research, there are several drawbacks which make them inappropriate for drawing inference about soil C changes. First, there are only (to our knowledge) 2–3 locations in the U.S. where EC is being used to estimate ecosystem C balances for systems under no-till (Baker et al., Verma et al. 2005), thus any inferences made cannot be considered general for no-till systems. Secondly, EC measurements have so far been for the first 2–3 years following conversion to no-till, in other words, during the transition phase between conventional and no-till when soil C increases are expected to be lowest. Finally, the typical rates of C accumulation determined from long-term plot studies (e.g. 0.1 to 0.5 tonnes C per ha) are likely to be within the 'error' estimate for **annual** net C accumulation using EC methods, thus there is little confidence in the estimates obtained for annual soil C changes (furthermore, EC estimates to date are typically unreplicated, hence a true determination of the error associated with these annual C changes are not possible). Hence the best method for determining soil C changes due to changes in soil management practices (including tillage) is through careful soil measurements in which the **accumulated** change in soil C over several years can be accurately determined.

An important point raised by Blanco-Canqui and Lal (2008) is that we currently lack good data on tillage effects under actual on-farm conditions. Our best information on tillage impacts are from field experiments administered by land grant universities and by governmental research agencies (e.g. ARS).[4] However, the approach taken in the paper by Blanco-Canqui and Lal—i.e., paired field ('across the fence') comparisons of tilled and no-till practices—involved a number of serious shortcomings. First, paired comparisons—because they lack a true control—have a high degree of uncertainty. Even if similar soil and slope conditions are chosen it is impossible to know if soil carbon contents were the same before a change in tillage practices occurred. Second, in on-farm comparisons it is difficult to isolate the effect of tillage from other management variables. In most of the comparisons described by Blanco-Canqui and Lal (2008), crop rotations and nutrient management, as well as tillage, were different within the paired comparisons—hence apparent differences between fields cannot, in fact, be attributed to tillage. As the authors themselves point out, several of the apparent tillage differences, if real, are likely due to factors other than tillage, e.g., from pg. 697, "Unlike the NT [no-till] field, however, the PT [plow tillage] field was under winter wheat and rye cover crops, which were plowed under every year. Thus we hypothesize that the higher SOC [soil organic carbon] with PT may have been due to the use of cover crops. In MLRA 124, the higher SOC with PT may have been due to the use of continuous corn, a high biomass-producing crop, in contrast with the corn-soybean-alfalfa rotation in the NT field. Annual burying of coarse corn residues in PT soils may have increased SOC at

[3] Baker et al. (2007) argue that one way in which plowed soils could accumulate **more** C in deeper depths in the soil profile, compared to no-till, is if no-till results in a more superficial distribution of roots, such that comparatively more root residues are deposited in deeper soil zones under plow tillage. Unfortunately, there are very few measurements of root distributions comparing tilled and no-tilled systems—Baker et al. (2007) cite only one study (from Switzerland) showing a deeper root distribution under plow tillage. While this potential mechanism is worthy of further research, it does not merit rejecting the many long-term tillage comparisons showing no significant differences in soil C below the depth of tillage.

[4] However, it should be pointed out that the vast majority of agricultural field research being used for management and policy decisions in other areas (e.g. on genetics, yield, nutrient management, etc.) is also derived from controlled field research settings, and not from on-farm studies.

lower depths compared with the relatively low-biomass-producing rotation adopted in NT farming".

Instead of using unreliable paired comparisons, new measurements of soil C change under actual on-farm conditions should be based on a resampling over time of on-farm benchmark sites, as part of a nationwide soil C monitoring network. Such a network is currently under development as part of the National Resources Inventory (NRI) administered by USDA–NRCS (J. Goebel, personal communication). Resources to establish and build out this network should be a high priority. In the meantime, our data from existing long-term field experiments provides the best source of knowledge about tillage (and other management) effects on soil C—here, the preponderance of evidence supports the conclusion that adoption of no-tillage increases soil C, relative to conventional tillage, in most U.S. cropland soils.

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Questions to EPA for the Record
House Committee on Agriculture
RFS implementation and Producer Eligibility Hearing
July 24, 2008

Robert Meyers, Principal Deputy Assistant Administrator, EPA Office of Air and Radiation

1) How is EPA interpreting the 'actively managed tree plantations' and 'immediate vicinity' language in the definition of 'renewable biomass'? What issues have you encountered while trying to determine what these terms mean?

When do you think a proposed rule will be out on the changes made to the definition of renewable fuel?

EPA is working with staff at the USDA Forest Service and has met with several stakeholder organizations to inform our interpretation of terms used in the definition of "renewable biomass," such as 'actively managed tree plantations' and 'immediate vicinity,' and to ensure that they reflect existing federal definitions and practices and common industry usage to the extent practicable.

Our proposed definitions for terms such as "renewable fuel" and "renewable biomass" will be included in the formal Notice of Proposed Rulemaking due out this fall.

2) In your testimony you said that the EPA continues to meet regularly with the Departments of Energy and Agriculture. Could you further describe specific areas regarding the implementation of the RFS where you have worked with the USDA? Have you consulted them on the lifecycle analysis greenhouse gas emission provisions?

We are working with USDA on a number of issues as we develop the EISA regulation. For example, we have had several conversations with USDA on the definition of renewable biomass and ways to implement this provision. These discussions have helped identify existing USDA programs and tools, such as databases and land tracking systems that could help us implement this provision. We also are consulting regularly with USDA as we develop the lifecycle greenhouse gas methodology. This close coordination has been particularly critical to the development of assumptions for our modeling, including on agricultural sector inputs like crop yields and biofuel plant processing emissions.

3) How can refiners or blenders that purchase renewable fuel be ensured that the renewable fuel they produce or purchase meets statutory requirements including the eligible feedstock requirements from the definition of renewable biomass? Will there be a verification process to track feedstocks through the chain supply chain? Who would be liable if feedstocks from ineligible sources where traced to a biofuel refinery or distributor?

We have met with a number of stakeholders and federal agencies to explore approaches for, and challenges related to, ensuring that feedstocks used for producing renewable fuel meet the definition of renewable biomass. The Notice of Proposed Rulemaking will put forth a proposed approach and other possible approaches and seek comment on them.

4) EISA requires the agency to apply lifecycle green house gas performance standards to the categories of renewable fuel. Can you talk about the modeling that EPA is using or looking at for determining the methodology for this measurement?

The definition of lifecycle analysis provided in EISA requires EPA to develop a methodology that includes all aspects of biofuels life cycle, including agricultural sector impacts and land use change. EPA's approach, working with other Federal agencies, academia, and stakeholders, is to use the best science and the most comprehensive models, data and tools available. We are using two forestry and agricultural sector models to determine the sector-wide impacts of increased renewable fuel production, including the impacts of international land use changes. We are using the Forest and Agricultural Sector Optimization Model (FASOM) to determine the domestic sector-wide impacts of increased biofuel production. For the international agricultural sector we are relying on the Food and Agricultural Policy Research Institute (FAPRI) model to determine the impacts to international production, decreases in other crops, and changes in total crop acres. In addition to using these and other state-of-the-art models (including the Greenhouse Gases Regulatory Emissions and Energy Use in Transportation (GREET), Global Trade Analysis Project (GTAP) and the Biofuels Energy Systems Simulator (BESS) models), we are working and consulting with experts in the field, including academics and other federal agencies such as DOE and USDA.

5) What can you do to minimize the level of regulatory uncertainty in the market with GHG emission reductions and the potential liability issues surrounding ineligible feedstocks in the supply chain, so as to not discourage the private investment needed to meet the aggressive RFS targets.

We believe that the aggressive targets contained in EISA provide opportunities and challenges for all parties involved in the production, distribution, and blending of renewable fuels. We also believe that the RFS targets can be best met, and our stakeholders best served, through a program that sets clear expectations for regulated parties, minimizes complexity while offering flexibility for compliance, and creates the proper incentives for investment.

6) The methods to evaluate greenhouse gas emissions and conditions within the renewable biofuels industry are likely to develop rapidly as production ramps up to 36 billion gallons a year in 2022. How do you plan to update your model evaluating lifecycle greenhouse gas emissions as the science progresses?

EPA's goal is to develop a robust methodology that accurately assesses the lifecycle greenhouse gas emissions of the renewable fuels required by EISA. Therefore, we are considering incorporating technological improvements within the biofuel industry in our modeling. For example we look at improvements in yields in the agricultural sector and how advanced biofuel production will evolve over time. We understand that it will not be possible to anticipate all future technology changes and that lifecycle analysis is a complex and evolving area. With respect to evolutions in analytical techniques, Congress recognized the need to strike a balance between responding to new developments and information and providing a stable regulatory environment for the parties that must comply with the Act. Thus, except where the Administrator is reviewing a prior adjustment to the greenhouse gas emission thresholds, the Agency may only adjust the greenhouse gas emission thresholds upon determining that there has been "a significant change in the analytical methodology." Further, EISA stipulates that the Agency only make such adjustments to the thresholds through a rulemaking that includes public notice and comment and that these adjustments only apply to new facilities that commence construction after the date of the adjustment.

7) What would happen if a feedstock or refinery production method found the feedstock or refinery process to have a higher greenhouse gas emission level than previously thought in a greenhouse gas model? Would you consider grandfathering refineries or feedstocks grown from specific producers?

EPA is still in the process of evaluating the grandfathering provisions in EISA and determining how these provisions apply to particular scenarios.

8) There were a number of dramatic changes in EISA, can you comment on how the education and outreach is going with stakeholder groups? What seems to be the biggest challenge for them?

Following last December's enactment of EISA, the Agency has met with more than thirty different stakeholder groups, including renewable fuel producers, technology companies, petroleum refiners and importers, agricultural associations, environmental groups, gasoline and petroleum marketers, other government agencies, pipeline owners and fuel terminal operators. Agency technical staff has participated in numerous conferences and workshops, which have allowed us to reach a broad range of technical, programmatic and policy issue experts. We also continue to meet and collaborate regularly with the Departments of Energy and Agriculture. Through these meetings, EPA has sought input on the key program design elements including lifecycle analysis, grandfathering, cropland criteria, and many other compliance-related issues. All of this information is being used to support development of the forthcoming proposal.

9) There is still a lot of research that needs to be done on emerging feedstocks and technology, but at this time what do you think seems most promising? Are you doing the research and development or is another agency, such as DOE and USDA?

EPA is collecting information on emerging technologies and feedstocks from both government and industry sources. The Departments of Energy and Agriculture are the appropriate departments to contact for specific information on such research programs. To support development of the forthcoming proposed rulemaking for the renewable fuel standard program, the Agency is reaching out to numerous stakeholders in both the feedstock and process technologies sectors to better understand the future potential of emerging feedstocks and new process technologies and the projected timing to commercial deployment. While there are many opportunities for production of biofuels from new feedstocks and new process technologies, any determination on commercial scale viability and volume projections would be presumptive at this time.

10) Can you give us a status update on what has been implemented under EISA RFS provisions and what remains outstanding? Do you have any indication when proposed rules on renewable biomass definitions will be out?

EPA is in the process of developing a regulation to implement the provisions of EISA, including the renewable biomass provisions. Our goal is to issue a proposed rule in the fall of 2008.

However, EISA established a renewable fuel volume requirement for 2008, which required the Agency to revise the standard for this year. EPA issued this standard on February 14, 2008. It is intended to lead to the use of 9 billion gallons of renewable fuel in 2008, as required by EISA. This notice can be found at http://www.epa.gov/fedrgstr/EPA-AIR/2008/February/Day-14/a679.htm

11) What remains to be the biggest impediment to fully implementing the RFS?

EISA includes a number of challenging provisions. However, EPA believes that through close coordination with our stakeholders and other federal agencies, we can promulgate a rule that complies with the requirements of the law. However, if by "full implementation" what is meant is the country's ability to produce and utilize 36 billion gallons of renewable fuel by 2022, the major challenges are the scaling of infrastructure capacity, creating an adequate transportation system, developing the technology to produce large quantities of advanced (non corn-derived) biofuels, and to identifying additional means of consuming biofuels beyond the levels that would occur through E10 use alone.

12) During testimony in the Senate, you indicated that it might take 18 months to write regulations for the expanded RFS. Will this timeline affect the targets set for 2009?

The Agency is evaluating various options and approaches to implement the intent of EISA for the 2009 calendar year. Several options are under consideration and are being generally vetted with key stakeholders. The Agency intends to introduce a specific proposal in the notice of proposed rulemaking due this fall.

13) Can you use materials from federal forests lands?

The Act allows biomass from certain areas of federal forest lands at risk from wildfire.

14) It is ironic that the authors and supporters of this legislation tout the benefits of the RFS as a way to reduce greenhouse gas emissions yet because of the feedstock restrictions, it will do little to help with one of the largest sources of emissions—wildfires. Last year alone, 9 million acres of forests burned, emitting roughly 60 million tons of carbon. That's roughly the equivalent of 12 million vehicles for one year (on average). How could the RFS help with this problem? In implementing the provisions relating to greenhouse gas emissions, is EPA considering ways to curb these emissions?

According to the National Interagency Fire Center, wildfires in 2007 occurred on 2.8 million acres of national forests, 2.9 million acres of other Federal lands, and 3.5 million acres of other state and privately owned woodlands and rangelands. The EISA definition of "renewable biomass" includes slash and pre-commercial thinnings from most non-federal forest lands for renewable fuel production. Removal of this material may reduce the risks posed by catastrophic wildfires. Additionally, the EISA definition of "renewable biomass" specifically includes biomass obtained from certain areas on non-federal and federal lands at risk of wildfire. We are working with staff at U.S. Forest Service to understand existing policies and definitions related to hazardous fuel reduction and landscape restoration activities that could be incorporated into the RFS program.

In our greenhouse gas lifecycle modeling, waste wood products are assumed to have zero greenhouse gas emissions associated with their production, other than emissions associated with their collection and transport. Multi-agency modeling does not take into account potential changes in the occurrence of wildfires due to the removal of forest residue. The U.S. Forest Service is currently conducting research in this area.

15) Do you this expect the differing definitions of "renewable biomass" in EISA and the Farm Bill, to create complications in implementation? If so, how are you working to resolve these complications with USDA and DOE? How will you determine what land has been "cleared or cultivated prior to enactment"?

We are reviewing the Farm Bill definition of "renewable biomass" and will work with USDA and DOE to minimize complications in implementing our respective programs.

With respect to determining what land has been recently cleared or cultivated, we are considering several options and will describe these options in the notice of proposed rulemaking due this fall.

16) The many arbitrary restrictions in the RFS including those that only allow use of planted trees, or crops from land if it was cropped prior to passage of EISA, would seem to create an implementation nightmare, if it becomes necessary to track what land crops came from or whether a tree was planted or naturally regenerated. How is EPA dealing with this issue and who do you expect to bear the burden of tracking this? Are there existing systems in place that would be helpful in dealing with this problem?

We have met with a number of stakeholders and federal agencies to explore approaches for, and challenges related to, ensuring that feedstocks used for producing renewable fuel meet the definition of renewable biomass. As part of this process, we have investigated existing systems and programs, both within the federal government and outside, that could assist or serve as models for implementing this provision of the Act. The notice of proposed rulemaking will describe our efforts in this area and various enforcement options.

17) Use of forest biomass in the production of biofuels creates an opportunity to achieve 2 goals at once: reduce wildfire fire risks to communities and produce renewable energy. The definition of "renewable biomass" in EISA includes forest biomass from federal lands if it is harvested from populated areas that are at risk of wildfire. What policies do the federal land management agencies already have in place that define these areas? Are you considering these policies as you develop the RFS regulations, to ensure that both goals can be met simultaneously? (USFS will want to respond as well)

We respectfully defer to the Departments of Agriculture and the Interior to address questions about current land management policies. EPA is working with U.S. Forest Service to understand existing policies and definitions that can inform our definition of "renewable biomass." For example, the Healthy Forests Restoration Act of 2003 and the Department of Interior and Related Agencies Appropriations Act of 2001 provide well established definitional criteria and standards for identifying the wildland urban interface and 'at risk' communities. The Healthy Forests Restoration Act in particular provides a means for prioritizing, planning, and executing hazardous fuels reduction projects on federal lands.

18) Are you familiar with the "Billion Ton" Report? Are there efforts underway to update this report and if so, can you give a rough estimate of how many tons of biomass from forests and agriculture land can be produced if a very strict interpretation of the RFS "renewable biomass" definition is applied? How many gallons of biofuel would this produce? Without these restrictions, how much biomass is available?

EPA is aware of the "Billion Ton" study. This report, along with numerous other reports and data sets regarding the availability of biomass, are being evaluated in the development of our forthcoming notice of proposed rulemaking expected for publication this fall. However, the report is currently being updated and revised to incorporate external factors not previously considered such as sustainability issues, crop requirements, and production capacities. USDA expects to release the publication in late fall. For this and other reasons, the Agency has not conducted an evaluation, using the definition of renewable biomass from EISA, of the biomass available for the production of biofuels as identified in this report.

Responses to Rep. Costa's questions (received after the above questions):

1) Due to the heavy winter and wet weather (flooding), it is likely that USDA's next crop report on August 12th is going to indicate that crop forecasts are going to be down significantly.

- **In your consultations with USDA have they indicated they have a contingency plan for food security and nutrition programs should there be a shortage of feed later this year due to weather and plantings issues this year? Does EPA have in its power the ability to develop a contingency plan should another year like this occur again next year?**
- **Would it make sense to at least freeze the conventional ethanol mandate – for fuels derived from feed crops – for the next 1-2 years the price and supply of feed is adequate to supply both feed and fuel needs?**

USDA's August crop report has now been released and reflects a significant increase in corn production. This comports with the weekly USDA Corn Crop Report, released on August 4th, which indicated that 66% of the corn crop is rated good or excellent, up from 56% in 2007.

As we describe in our Federal Register Notice, signed on Thursday, August 7, 2008, we do not believe a waiver of the RFS mandate is appropriate at this time. However, we will continue to monitor the situation. We believe the waiver process allows us to reevaluate the impact of the RFS mandate should there be significant changes in market conditions.

2) Administrator Johnson just announced two days ago that he was delaying a decision regarding the State of Texas' petition to waive 50% of RFS due to the overwhelming amount of public comment have to be reviewed and analyzed. I know many of us in California who represent dairy, poultry, and livestock farmers have seen the effects of our ethanol policies and are considering making similar requests regarding RFS. Administrator Johnson also indicated that the process remains fair and open and no agreements have been made with any party to the substance and timing of the decision on the waiver request. I know you all are required to work with the Department of Energy and the United States Department of Agriculture, do you have any information or can you report to me who else you are consulting with in making your decision and give me the criteria now being utilized to determine what the definition of "severer economic harm" is to the economy?

In evaluating Texas' waiver request, we consulted with the U.S. Department of Agriculture and the U.S. Department of Energy, as required by the Energy Independence and Security Act (EISA) of 2007. In addition, we reviewed over 15,000 comments in response to our Notice of Waiver Request, including dozens of substantive comments and studies submitted by parties that supported and opposed the waiver request. We received and reviewed comments from a diverse set of parties, including the California Poultry Federation, California Cattlemen's Association, California Dairy Campaign, Cal-Maine Foods, National Cattlemen's Beef Association, the American Meat Institute, the National Chicken Council, the National Milk Producers Federation, the National Pork Producers Council, Kraft Foods Global, the Renewable Fuels Association, the Texas Farm Bureau, and the Governors' Ethanol Coalition.

As we describe in our Federal Register Notice, signed on Thursday, August 7, 2008, the Clean Air Act does not define the term "severely harm" as used in the RFS waiver provision. We discussed this in the Notice, and stated that the straightforward meaning of this phrase indicates that Congress set a high threshold for issuance of a waiver. EPA did not need to interpret this provision in any greater detail for purposes of acting on Texas' petition, however, as the circumstances in that case clearly did not demonstrate that the RFS itself was causing the kind of harm that would be characterized as severe.

3) I have recently heard from some of my poultry operators (Foster Farms) in California that have told me about their recent decision not to build a plant in Colorado. $126,000,000 which would have created a 1000 jobs initially. Another company (Sanderson Farms) decided to halt construction of a new plant in North Carolina. A $200,000,000 project which would have created 1,500 jobs initially. I have heard similar examples from my dairymen. I am sure there are hundreds of other examples across the country, all suggested that the rapidly increasing price of corn feed and the fact that there is no end in sight. Would you say, in your opinion, that this would be an example of "severe economic harm?" If not, then can you help me understand a better example?

As we describe in our Notice, for the purposes of granting a waiver of the RFS mandate, EPA believes that there must be generally a high degree of confidence that the implementation of the RFS mandate is causing the economic harm. EPA interpreted the statutory provisions to require: a determination based on the expected impact of the RFS program itself, a generally high degree of confidence that implementation of the RFS program would severely harm the economy of a State, region, or the United States, and a high threshold for the nature and degree of harm by requiring a determination of severe harm. EPA and almost all commenters recognize that there are many factors that affect the use of biofuels in the U.S. and the overall impact of such use. However, the RFS waiver provision calls for EPA to evaluate a much narrower set of issues, focusing on just the impact of the RFS mandate.

EPA evaluated all of the evidence submitted by Texas and others, and also conducted its own analysis of the issues. After weighing all of the evidence before us, EPA determined that the evidence does not support a finding that implementation of the RFS would harm the economy of a State, region, or the United States, because the evidence does not reach the generally high degree of confidence required for issuance of a waiver under CAA section 211(o)(7)(A). Further, EPA believes that the evidence supports the determination that the RFS would likely have no impact on ethanol production volumes during the 2008/2009 corn marketing year (September 2008 through August 2009), and therefore no impact on corn, food, or fuel prices.

EPA has no specific information on the investment decisions made by Foster Farms and Sanderson Farms, and no information to show that the RFS itself was the cause of the forgone investment decisions by these businesses.

At this time, EPA has not set a threshold for determining severe economic harm, although as described in our response to question 2, we believe that Congress intended the term serve to be interpreted to meet a high threshold of harm.

RESPONSE TO QUESTIONS SUBMITTED TO JETTA L. WONG, SENIOR POLICY ASSOCIATE, SUSTAINABLE BIOMASS AND ENERGY PROGRAM, ENVIRONMENTAL AND ENERGY STUDY INSTITUTE

Question 1. Do you think that creating a market for low value woody waste material from Federal forests in the RFS would create a financial incentive to expand forest management practices or other forest stewardship activities?

Answer. The short answer to this question is yes, because the RFS requires blenders and distributors to sell specific quantities of biofuels produced from specific sources and feedstocks. Including biomass produced as a result of public land management among those sources will establish a guaranteed market for these materials and direct capital towards an expansion of these management practices. On the other hand, *excluding* biomass from public land management will ensure that fuel producers and blenders actively avoid these materials in favor of feedstocks *that are* eligible, such as agricultural commodities, energy crops, and farm residues.

To explore this question more thoroughly, it is important that we define what is meant by "expand forest management". There are several perspectives on what an expansion of Federal forest management could entail and whether or not that would be a positive thing. In the view of many organizations, including EESI, there are many acres of Federal forestland that could benefit from silvicultural activities intended to restore past ecological conditions, maintain ecosystem functions, or improve the value of forest stands from an economic or ecological perspective. As I outlined in my testimony, harvesting biomass can be an effective tool in many forests for creating habitat, promoting biodiversity, improving timber stocks, slowing or preventing pest infestations, reducing fire risk, and achieving a number of other objectives. These activities are referred to by a number of different names, including ecosystem restoration, timber stand improvement, and forest stewardship, but they all have in common the fact that they provide social, economic, and ecological benefits above and beyond the value of the wood products that are produced. These activities are not appropriate in all forests, but they can be valuable silvicultural tools where they are appropriate.

Unfortunately, in today's market most stand improvement activities are either only marginally profitable or, more usually, a net expenditure (these activities are commonly known as 'pre-commercial thinnings'). Although some industrial forest owners may have the capital to treat these activities as long-term investments, most non-industrial private forest (NIPF) owners, as well as the Federal Government, cannot afford to invest in these treatments on any meaningful scale. Because of this, the U.S. Forest Service has included developing new and expanded markets for bioenergy and bio-based products as an important goal of its woody biomass utilization strategy.[1] The exclusion of this material from the RFS will make it more difficult to develop markets for low-quality wood, small diameter trees, brush, and other low value forest products. **Eliminating this exclusion is a necessary first step to developing these markets and providing the capital that is necessary to achieve national stewardship and forest restoration objectives.**

In contrast to the preceding perspective, a number of groups and individuals see expanded forest management in Federal forests as essentially a dangerous precedent to set. A minority of these groups ascribe to a philosophy that sees all intensive human activities as inappropriate in public forests. The majority of these groups, however, are more concerned with specific environmental impacts they believe would result from an expansion of existing management. This viewpoint tends to downplay the value of stewardship activities and focus on the negative consequences for forest ecosystems, wildlife, soils, and water resources that **could** result from increased management activities. In addition, people with this perspective frequently do not trust Federal land managers to manage public resources responsibly and for the greater good of the public. There is validity to many of these concerns. Sloppy or inappropriate management practices can undoubtedly have unintended environmental consequences.[2] In some cases, the impacts of these practices on specific processes and components of forest ecosystems are not yet even fully understood.[3] History and experience also provide reasons to warrant concern; past (and existing)

[1] Patton-Mallory, Marcia, ed. 2008. Forest Service, U.S. Department of Agriculture woody biomass utilization strategy. Washington, D.C.: U.S. Department of Agriculture, Forest Service. 17 p.

[2] R.A. Young and R.L. Giese (Ed.). INTRODUCTION TO FOREST SCIENCE. 2ND ED. John Wiley & Sons, Inc., 1990. 586 p.

[3] Hacker, J.J. 2005. *Effects of Logging Residue Removal on Forest Sites: A Literature Review.* West Central Wisconsin Regional Planning Commission. 29 p.

markets for biomass products, such as charcoal and woodchips, have often led to clear cutting and other destructive management practices.[4–6]

For the reasons mentioned above, some people feel that incentives such as the RFS could promote widespread and destructive practices across many of the country's national forests and other public lands. Implicit in this thinking, however, is the assumption that Federal land management is primarily driven by the marketplace. This is far from true. **The marketplace is certainly important in determining what projects are feasible or preferable at a given time, *but the broad national objectives behind Federal land management, such as biodiversity, wildlife habitat, watershed protection, and resource production, are established by law.*** Several land management acts, including those for the national forests (16 U.S.C. 1604), BLM public lands (43 U.S.C. 1712), and the National Wildlife Refuge System (16 U.S.C. 668dd), collectively identify these broad objectives and require individual management units to prepare comprehensive management plans illustrating how the broad objectives translate into local, on-the-ground management prescriptions. These management plans are open to public comment and judicial review. Additional environmental laws, notably the Endangered Species Act and national Environmental Protection Act (NEPA), help to further ensure that public land management activities are driven by principles of good stewardship and not merely by the demands of the marketplace.

Another error exists in some groups thinking that all public lands would be open to biomass harvesting. This a misplaced fear. Out of the nearly 672 million acres of public land, more than 105 million acres (~15.7 percent) are currently classified as wilderness[7] and are therefore off-limits to any commercial activities (16 U.S.C. 1133). Many more acres are inaccessible due to topography, infrastructure, or remoteness.[8]

To summarize my answer, I do believe that including public lands in future versions of the RFS will aid considerably in providing needed financial incentives to expand forest management *where that management is in line with national management directives, mandatory site-specific management plans, and public law.* Existing restrictions will largely or entirely prevent the expansion of management activities that fly in the face of statutory stewardship objectives and environmental review. Furthermore, this financial incentive will not expand management in the millions of acres that are classified as Wilderness or are otherwise inaccessible.

Question 2 Your testimony discussed the effect of forest thinning and silvicultural activities on the ability of a watershed to function properly and increase water yield. Can you explain how thinning a forest can be part of a stewardship plan to improve water quality and forest health?

Answer. Water is one of the most valuable of the many goods and services produced in forests. Approximately ⅔ of drinking water in the United States is generated from forested landscapes.[9] The Congress recognized this important fact in the Organic Act of 1897, establishing that one of the primary purposes of the national forest system would be "to secure favorable conditions of water flows" (16 U.S.C. 471).

As water moves through a forested watershed, it is in a state of constant interaction with soils, trees, and other forest vegetation. Evaporation, transpiration, infiltration, surface flow, and other measures of hydrological function are all directly and indirectly influenced by:

(1) stand-level characteristics, such as canopy cover and tree density, and

(2) landscape-level characteristics, such as stand heterogeneity and species diversity.

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[4] Kambewa, P., B. Mataya, K. Sichinga, and T. Johnson. 2007. "Charcoal: The Reality, A Study of Charcoal Consumption, Trade, and Production, in Malawi." International Institute for Environment and Development. 58 p.

[5] The Southern Center for Sustainable Forests (Duke). 2000. "Economic and Ecological Impacts Associated With Wood Chip Production in North Carolina, Integrated Research Project Summary." Prepared for the North Carolina Department of Environment and Natural Resources. 82 p.

[6] Governor's Advisory Committee on Chip Mills. "Chip Mill Experiences in Other States." Missouri Department of Natural Resources. *http://www.dnr.mo.gov/chipmills/fr__sectionh.htm* (accessed August 8, 2008).

[7] U.S. Congressional Research Service. *Federal Land Management Agencies: Background on Land and Resources Management.* RL32293. 75 p.

[8] Oak Ridge National Laboratory (DOE) and USDA. DOE GO–102995–2135, *Biomass as Feedstock for a Bioenergy and Bioproducts Industry: Feasibility of a Billion-Ton Annual Supply.* April 2005.

[9] The National Academy of Sciences. July 2008. Report in Brief: *Hydrologic Effects of a Changing Forest Landscape.* 4 p.

For this reason, any activity that modifies vegetation, including thinning, has the potential to alter the flow, storage, and chemical properties of water in the watershed. These interactions are complex, however, and vary widely from forest to forest. **Like all aspects of forest management, determination of appropriate management activities must be made on a stand-by-stand basis, using site-specific conditions and management objectives as a guide.**

The relationship between *water quantity* and forest coverage is especially complex. Broadly speaking, harvesting activities can be used to temporarily increase streamflow after storm events[10–13] but the effect is generally short-lived and dependent on repeated treatments.[14] Harvests and thinning activities can also be effective at increasing accumulation of snow under the forest canopy.[15] Snowpacks are an important source of water across much of the United States and a deeper snowpack translates into greater total storage of water. On some forests, however, thinning can also result in accelerated loss of the snowpack and higher peak flows,[16] increasing the chances of flooding. Early snowpack melting is highly correlated with an increase in wildfires.[17] As climate change exacerbates this effect, we will want to be even more careful that forest management activities do not have unintended consequences. Local conditions, including flood risk and wildfire conditions, must always be carefully scrutinized to ensure that harvesting activities will help achieve water quantity objectives.

Thinning and harvesting activities can also be used to achieve *water quality* objectives, especially in the context of fire management. High-severity wildfires can increase erosion, and, ultimately, sediment flow to water bodies.[18] Through a judicious thinning of understory vegetation and overly dense stands, often called hazardous fuel reduction, the frequency and severity of wildfires can be effectively reduced in some forests.[19–23] However, hazardous fuel reduction is not appropriate for all forest types.[24] Where this practice is appropriate, consideration must be given to possible trade-offs between water quality benefits and potential negative impacts, such as soil compaction and erosion from the use of heavy machinery.[25]

The hydrological consequences of thinning or any other form of forest management should never be considered in isolation, but as part of an overall management strategy to achieve multiple stewardship objectives, including habitat management, timber production, ecological restoration, recreation, and aesthetics. To this end, a management plan is an essential tool on both private and public lands, the latter

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[10] Troendle, C.A. 1983. *The potential for water yield augmentation from forest management in the Rocky Mountain region.* JOURNAL OF THE AMERICAN WATER RESOURCES ASSOCIATION 19(3): 359–373.

[11] Stednick, J.D. 1996. *Monitoring the effects of timber harvest on annual water yield.* JOURNAL OF HYDROLOGY 176: 79–95.

[12] R.A. Young and R.L. Giese (Ed.). INTRODUCTION TO FOREST SCIENCE. 2ND ED. John Wiley & Sons, Inc., 1990. 586 p.

[13] Brooks, K.N., P.F. Ffolliot, H.M. Gregersen, and L.F. DeBano. *Hydrology and the management of watersheds. 3rd Ed.* Blackwell Publishing, 2003. 547 p.

[14] The National Academy of Sciences. July 2008. Report in Brief: *Hydrologic Effects of a Changing Forest Landscape.* 4 p.

[15] Brooks, K.N., P.F. Ffolliot, H.M. Gregersen, and L.F. DeBano. *Hydrology and the management of watersheds. 3rd Ed.* Blackwell Publishing, 2003. 547 p.

[16] Brooks, K.N., P.F. Ffolliot, H.M. Gregersen, and L.F. DeBano. *Hydrology and the management of watersheds. 3rd Ed.* Blackwell Publishing, 2003. 547 p.

[17] Westerling, A.L., H.G. Hidalgo, D.R. Cayan, T.W. Swetnam. 2006. *Warming and earlier spring increase Western U.S. forest wildlife activity.* SCIENCE 313: 940–943.

[18] Brooks, K.N., P.F. Ffolliot, H.M. Gregersen, and L.F. DeBano. *Hydrology and the management of watersheds. 3rd Ed.* Blackwell Publishing, 2003. 547 p.

[19] Agee, J.K. and C.N. Skinner. 2005. *Basic principles of forest fuel reduction treatments.* FOREST ECOLOGY AND MANAGEMENT 211:83–96.

[20] Brose, P. and D. Wade. 2002. *Potential fire behavior in pine flatwood forests following three different fuel reduction techniques.* FOREST ECOLOGY AND MANAGEMENT 163: 71–84.

[21] Pollet, J. and P.N. Omi. 2002. *Effect of thinning and prescribed burning on crown fire severity in ponderosa pine forests.* INTERNATIONAL JOURNAL OF WILDLAND FIRE 11(1)1–10.

[22] Stephens, S. L. 1998. *Evaluation of the effects of silvicultural and fuels treatment on potential fire behavior in Sierra Nevada mixed-conifer forests.* FOREST ECOLOGY AND MANAGEMENT. 105:21–35.

[23] Graham, R. T., S. McCaffrey, and T.B. Jain (tech. eds.) 2004. *Science basis for changing forest structure to modify wildfire behavior and severity.* Gen. Tech. Rep. RMRS–GTR–120. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 43 p.

[24] Odion, D.C., E.J. Frost, J.R. Strittholt, H. Jiang, D.A. Dellasala, and Max. A. Moritz. 2004. *Patterns of Fire Severity and Forest Conditions in the Western Klamath Mountains, California.* CONSERVATION BIOLOGY 18:4 927–936.

[25] J.J. Rhodes, W. L. Baker. 2008. *Fire probability, fuel treatment effectiveness, and ecological tradeoffs in Western U.S. Public Forests.* THE OPEN FOREST SCIENCE JOURNAL 1:1–7.

of which already require exhaustive plans (see *Question 1*). A management plan is a comprehensive document that identifies objectives and prescribes a series of management activities that will achieve those objectives in a complementary fashion. In some forests, objectives will be best achieved by allowing stands to develop on their own, but in many forests some mixture of harvests, thinning, and other silvicultural activities will be valuable tools, especially where ecosystem processes, stand structure, and habitat have been adversely impacted by past management activities. In these forests, restoration activities will generate woody biomass in the form of logging slash, brush, and low-quality trees that often can be available for use in the production of renewable fuels.

The most important thing that must be done to preserve and maintain both water quantity and water quality is to ensure that forested watersheds remain forested. When forests are replaced by urban sprawl, suburban development, or other non-forest uses, watershed functioning can change drastically and often for the worse.[26] **Given increasing financial pressures to sell or develop forestlands across the country, providing financial incentives for landowners to keep and maintain forests should be a crucial component of any policy or strategy that seeks to protect water supplies.** Unfortunately, entire watersheds composed primarily of private forestland are effectively excluded from the Renewable Fuel Standard due to the narrow definition of *renewable biomass* included in the law, specifically section 42 U.S.C. 7545(o)(1)(I)(iv).

In New York State, the Watershed Forestry Program (WFP)[27][28] is an excellent example of a program promoting private forest stewardship as a means of achieving broad watershed objectives. This program was established in the 1990s, when the declining quality of drinking water in New York City forced decision makers to choose between installing an expensive filtration system or to find a way to protect and preserve the upstream watershed. Unlike municipal watersheds dominated by public or state land, 90 percent of upstate New York is privately-owned by a large number of farmers and non-industrial forest owners; 75 percent of this watershed is forested. Although at the time filtration was the standard approach, far-sighted officials decided to work with upstate landowners to prevent urban development and promote best management practices on farms and forests. To accomplish this, the Watershed Agricultural Council (WAC) was established as a liaison between the city and rural landowners. The WFP was created within WAC to focus on stewardship of forested landscapes. The program consists of cost-share programs, technical assistance, education/outreach and other incentives to help landowners develop management plans, implement best management practices, and *improve the economic viability of working forests.* The success of this program is dependent on this economic viability to preserve the diverse, forested landscape that provides clean, reliable water supplies downstream. By excluding these lands from the RFS and removing an important incentive for a valuable product (renewable fuels), the current biomass definition will have an effect directly opposed to the goals of this program.

To summarize, there are a number of circumstances in which forest management activities such as thinning can be used to help achieve objectives for both water quantity and quality. There are also a number of circumstances in which thinning can have negative impacts. Forest management activities must always be tailored to the specific ecological characteristics and objectives of the forest under consideration. Thinning can be a valuable tool in managing forests for a multitude of values and objectives, including ecosystem restoration, habitat management, watershed maintenance, and other forest health objectives. Engaging landowners in multiple-value forest stewardship can be effective in preserving a forested landscape against development and urban encroachment. This is the single most important thing that can be done to ensure healthy watersheds and clean, plentiful water for generations to come.

Question 3. If woody biomass cannot count against the RFS, what else could it be used for?

Answer. There is a wide selection of products that can be made from woody biomass in addition to renewable fuels. It is preferable, however, that we retain the fullest possible range of options for utilization of this renewable resource, so that communities wishing to utilize woody biomass can take full advantage of the regional variations in market demand, business opportunities, and economic con-

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[26] Brooks, K.N., P.F. Ffolliot, H.M. Gregersen, and L.F. DeBano. *Hydrology and the management of watersheds. 3rd Ed.* Blackwell Publishing, 2003. 547 p.

[27] V. Brunette and R.H. Germain.2003. *Forest Management in the New York City Watershed.* 0649–B3. Submitted to the XII World Forestry Congress.

[28] Watershed Agricultural Council. *Watershed Agricultural Council's Forestry Program: 10-Year Anniversary: 1997–2007.* 40 p.

straints. Biomass in all its forms will need to be an important component of any strategy to address global climate change, one of the biggest environmental and social hazards facing the planet today. The most important component in such a strategy must be the substitution of renewable alternatives for fossil fuels wherever they are being used—in the production of electricity, heat, liquid fuels, and other chemicals and products. There are, however, a number of renewable technologies that can be used in the production of electricity and heat, including wind, solar, hydrokinetic, tidal, and geothermal technologies. On the other hand, **biomass is the only viable, short-term alternative to petroleum-based transportation fuels.** Until we have the capacity to power a substantial number of vehicles with renewable electricity or other renewable technologies, renewable fuels will remain an essential tool in the effort to reduce oil consumption and stall the acceleration of climate change.

In the absence of appropriate incentives for renewable fuels, there are a number of products that can be made from woody biomass. Pulp and paper mills are the traditional end users of small trees, low-quality wood, and other sources of biomass unusable for sawn wood products. An increasing number of lumber mills are also able to produce boards, poles, fence posts, and other solid wood products from small-diameter and low-quality biomass. Engineered wood products, such as chip board and oriented strand board (OSB), are another possible outlet for this material. There are also a number of other energy products (in addition to renewable fuels) that can be produced from biomass. Woodchips, sawdust, and hog fuel can be used to produce electricity in clean, low-carbon biopower plants. Wood pellets, firewood, and wood chips can provide space and process heating. Woody biomass can also be combusted at high-efficiency in combined-heat-and-power (CHP) operations. Additionally, a wide variety of chemicals, plastics, foams, and other bio-based products can be produced from wood and cellulosic materials.

In the face of such an impressive menu of options, it is tempting to draw the conclusion that the exclusion of woody feedstocks from the RFS is of no consequence—that there are plenty of other uses and plenty of other market opportunities for this renewable resource. This would be a mistaken conclusion for a number of reasons. It is preferable that markets for biomass be as diverse and inclusive as possible. Competition for woody biomass among a larger number of end users will help ensure landowners the best price for their biomass and encourage them to invest in better management practices. Lack of competitive markets for biomass over the years has been one of the factors leading to limited use of stand improvement thinning and other long-term forest investments. This has also led to an increased pressure to sell land to developers.

These products can all be produced singly, but greater efficiencies are often achieved through producing two or more products in an integrated biorefinery. By producing a mixture of products simultaneously, an integrated biorefinery can utilize a greater proportion of the chemical constituents found in biomass feedstocks, adding value to the production chain and reducing waste. Many integrated biorefineries will likely produce renewable fuels as one of the higher value products. If many woody feedstocks are excluded from the RFS, the entire suite of products being produced will be rendered less competitive and perhaps non-competitive.

Whether one or multiple products are produced, there is considerable regional variability in market demand, economic conditions, production costs, infrastructure, natural resources, and local laws. Local market opportunities (and constraints) will dictate what products are most economically feasible in a given state or region. If the demand for transportation fuels in a region is the strongest, then renewable fuel producers may be able to offer the best price for material in comparison to other buyers. By removing biofuel production from the equation, a complete market does not exist and the true value of the material may never be realized. Ultimately, it should be up to the community to decide the best use of its forest resources.

For example, of the 7.7 million households in the United States that use heating oil for space heating, 5.3 million (69 percent) of these households are located in the Northeast states.[29] Within these states,[30] 52 percent of all home heating utilizes heating oil. Unfortunately, the price of this essential commodity is escalating rapidly. As of August 5, 2008, the NYMEX Futures Price for heating oil was $3.28/gal, up from $1.94/gal a year ago.[31] As these prices continue to rise, the generation of

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[29] United States Department of Energy. "Northeast Home Heating Oil Reserve." United States Department of Energy. *http://www.fossil.energy.gov/programs/reserves/heatingoil/* (accessed August 11, 2008).

[30] Northeast states include CT, MA, ME, NH, NY, RI, and VT.

[31] Energy Information Administration. "New York Harbor No. 2 Heating Oil Future Contract 1." Energy Information Administration. *http://tonto.eia.doe.gov/dnav/pet/hist/rhoc1d.htm* (accessed August 11, 2008).

thermal energy will become an increasingly attractive use for local biomass resources, including wood chips, cord wood, wood pellets, or biomass-based heating fuel). In contrast to the Northeast, states in the West[32] use very little heating oil. Only Idaho, Montana, Nevada, Oregon, South Dakota, Utah, and Washington use heating oil at all, and in no more than seven percent of homes. While this region may not have the demand for heating oil substitutes, there is a significant demand for transportation fuels. In 2006 the western United States used approximately 1,167 million barrels of oil for transportation purposes, approximately 23 percent of the national total.[33] Renewable fuels may very well be the most economically feasible use of woody biomass throughout the west. And indeed the West has ample stocks of biomass in its forests, many of which are on public lands and could benefit from thinning activities, but these are excluded from the RFS.

The argument has been made that renewable fuels are a less sustainable use for forest biomass than heat or electricity. This is a somewhat misleading argument. It is true that there is a finite supply of biomass that can be sustainably removed from a forest at any given point in time. It is also true that sustainability should be at the core of all forest management decisions. The end use of the materials being removed, however, does not affect conditions in the woods. **What matters is not what product is being produced, but how the harvest will improve or degrade the forest ecosystem.** The impact of a given harvest on habitat, biodiversity, and water quality will be the same, regardless of whether the wood is shipped to a CHP plant, a renewable fuels producer, or a lumber mill.

In regions with limited demand for heat and power, a new market for renewable fuels could provide financial incentives to engage in restoration forestry, habitat management, stand improvement thinning and other proactive stewardship activities. Incentives which add value to currently undervalued material could help defray some of the cost of improving forest resources or restoring desired ecosystem conditions. By getting the most value for harvested woody biomass, the limited budgets that are available for these activities can be stretched to achieve more. On public lands, especially, funding for stand improvement and restoration activities is decreasing due to budget cuts and the escalating costs of fire fighting.[34] Improving the cost-competitiveness of woody biomass (with incentives such as the RFS) will open up private sector capital that can be leveraged to achieve these and other important stewardship objectives.

When discussing alternative uses for biomass, it is important to acknowledge that the RFS language has set a precedent regarding the definition of *renewable biomass*. Future Federal and state laws, such as a Renewable Portfolio Standard or renewable tax credits, could adopt this definition, erecting a barrier for the use of biomass for many other purposes. For these reasons, it is important that we have a solid, agreed-upon definition of *renewable biomass* that promotes sustainability, innovation and appropriate technologies at the appropriate scale. A suite of incentives that builds off of the same definition will provide a level playing field among the different possible uses for wood.

Question 4. Do you think EPA will be able to track if wood procured from a tree plantation *versus* a naturally regenerated forest was used to count against the RFS? How do you think this tracking and process will work?

Answer. Tracking forest products from woods to consumer is notoriously difficult, but it is increasingly gaining popularity among conservationists, sustainability experts, and the forest products industry as a solution to the unsustainable (and often illegal) exploitation of global forest resources.[35] Even though there are numerous problems and difficulties with certification systems, many companies involved in both the forest products and the retail industry are moving in this direction. Companies such as Lowe's are currently purchasing and marketing wood products by the Forest Stewardship Council as a means to avoid products from endangered forests as well as give customers the ability to make an informed purchase.[36] As the public becomes more engaged and informed about sustainability issues, they will increasingly look to make sure that products sold in the United States are produced in a responsible manner. A number of provisions in the Renewable Fuel Standard (RFS),

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[32] Western states include AZ, CA, CO, ID, MT, NV, NM, OR, SD, UT, WA, and WY.

[33] Energy Information Administration. "Table F9a: Total Petroleum Consumption Estimates by Sector, 2006." Energy Information Administration. *http://www.eia.doe.gov/emeu/states/sep_fuel/html/fuel_use_pa.html* (accessed August 11, 2008).

[34] USDA Forest Service. February 2008. Fiscal Year 2009, President's Budget, Budget Justification. 426 p.

[35] Kemper, S. Spring 2008. "Forest Destruction's Prime Suspect". Environment Yale 7(1):4–31.

[36] Lowe's. "Lowe's Wood Policy." Lowe's. *http://www.lowes.com/lowes/lkn?action=pg&p=PressReleases/wood_policy.html* (accessed August 12, 2008).

including the greenhouse gas screens, essentially require the EPA to implement some type of tracking system to ensure that production of feedstocks, including woody biomass, meet emissions screens and other requirements. Although this process will not be easy, it is not an impossible task. **The development of an effective tracking system could be an opportunity, not only to ensure that greenhouse gas screens are met, but also to verify that feedstocks are produced using sustainable management practices.**

Implementing a feedstock tracking system will require some hard work and creativity on the part of EPA, but *the task is unnecessarily complicated by the narrow and exclusionary nature of the definition of renewable biomass* included in the RFS. This definition will not only make tracking more difficult (and consequently more expensive), but it will also serve to focus the EPA's tracking efforts on details that are entirely irrelevant to forest sustainability. The definition draws distinctions between sources of woody biomass based primarily on two criteria:

(1) whether the material came from public or private forests and

(2) whether the trees being cut come from plantations or naturally-regenerated stands.

Unfortunately, neither of these criteria are true sustainability criteria. The first only tells you who owns the forest and the second is only one single silvicultural detail arbitrarily selected out of the many such details that could describe how a forest is being managed. **By themselves, neither ownership nor regeneration system will give you any information at all about whether or not a forest is being managed sustainably.** The sustainability of a managed forest can only be assessed by looking at the whole suite of management practices, management objectives, and ecological conditions found in the forest at hand.

Not only are these criteria uninformative to the sustainability question, but they will add a variety of logistical complexities to the tracking process, especially the distinction between planted and naturally-regenerated stands. Many forests are composed of a mixture of stands relying on both artificial (planted) and natural regeneration. Often, there is a mixture of planted trees and trees that grew from a seed or a sprout (natural regeneration) *within the same stand.* Under these circumstances, it is unlikely that loggers will be able to separate each stem, branch, and chunk of biomass in the woods by whether or not it came from a planted tree. In many cases, it is not even possible to determine by looking at a mature tree whether it was planted or seeded naturally many decades before.

Similar problems will arise with any biomass feedstocks that do not originate exclusively from a single forest, such as woody residues from sawmills, furniture mills, and pulp mills. These residues are an attractive feedstock because they are concentrated at the mill and may require less transportation and processing. The production of renewable fuels from these residues can provide an additional revenue stream for mills, whether those residues are sold, or better yet, utilized on location as an integrated biorefinery. Additionally, mill residues are an attractive feedstock from an environmental perspective, as they are byproducts of existing industries and do not require any direct increase in the number of trees being harvested. Unfortunately, industrial residues are not explicitly included in the current definition as a separate allowable category, and EPA will, therefore, have to track these residues to the ultimate source. This is not an easy task, however. Many mills source materials from a mixture of Federal lands, plantations, naturally-regenerated forests, and foreign imports. Unless residues were to be segregated by their exact source, it would be extremely difficult to determine the exact source of the residue and, therefore, the portion of available mill residue that would be eligible under the current rules of the Renewable Fuel Standard would be unclear. To require mills to segregate residues based on source could also increase operational costs of a biorefinery and act as a disincentive. Currently there are two Department of Energy-funded biorefinery projects in Maine [37] and Wisconsin [38] co-located with pulp mills to produce biofuels. If we are going to invest public money in these important technologies, we should be careful to ensure that government incentives and programs work in a complementary fashion and are not at cross-purposes with each other.

Non-domestic sources of biomass will likely be even more difficult to track, as an enormous quantity of imported wood and wood products is of unknown origin.[39] The illegal trafficking of globally harvested and smuggled timber compounds this problem. The Food, Conservation, and Energy Act of 2008 (the farm bill) included

[37] "RSE Pulp & Chemical, LLC." Department of Energy. 2008.
[38] "Flambeau River Biofuels LLC." Department of Energy, 2008.
[39] Kemper, S. Spring 2008. "Forest Destruction's Prime Suspect". Environment Yale 7(1):4–31.

amendments to the Lacey Act intended to reduce traffic in illegal timber. The Lacey Act was originally enacted to control the illegal trafficking of wildlife across state lines.[40] The farm bill amended the act to prohibit the transfer of all illegally harvested wood and wood products into the United States. If implemented properly, the Lacey Act amendment provides a means to ensure that wood sourced for products as well as biofuels production has been harvested legally according to domestic and international laws. This is an important piece of legislation, but it only protects against the importation of *illegal* wood products, not legal products produced unsustainably. The two often go together, but not always. EPA will need to determine how best to label legally-imported biomass and count it towards the RFS.

Despite the difficulties in tracking wood products, there are a number of examples of tracking systems currently in place. The Forest Stewardship Council's (FSC) forest certification system is one example of such a tracking system. Under FSC, third-party auditors certify forests that are managed in accordance with a specific set of sustainability criteria. All wood products, including furniture, timber, pulp, and paper that originate from a certified forest can be sold with the FSC label. This demonstrates to consumers that responsible forestry activities have taken place throughout all steps of production for a wood product. An important component of this system is chain-of-custody certification, in which all companies involved in the production or transfer of certified wood products must be certified by the FSC and documentation must be kept by each company detailing the sale or transfer of any products. This establishes a paper trail and allows one to trace any wood product marked with the FSC label back to an FSC certified forest. Under FSC chain of custody rules, producers of wood products containing a mixture of certified and uncertified wood have the option of labeling their products with the FSC Mixed Sources label, assuming that uncertified wood meets certain basic standards of legality, sustainability and social justice.[41]

It remains to be seen exactly how EPA will propose to track and label biomass feedstocks for the RFS or how they will handle blended feedstocks or feedstocks from multiple sources. They may use a manifest chain-of-custody system, like FSC, or they might develop a new approach. Whatever they decide, it is almost certain that the exclusionary nature of the *renewable biomass* definition will inject difficulties into the process and direct EPA's efforts away from tracking the overall sustainability of biofuel feedstocks. There are two solutions that can simultaneously make tracking biomass easier and more effective:

(1) Rewrite the definition of *renewable biomass* to include genuine measures of sustainability instead of exclusions. Woody biomass should be eligible from any forest, public or private, plantations or natural forests, as long as harvesting is done in accordance with best management practices, improves and maintains ecosystem services, and promotes other management objectives.

(2) Require management plans for all forests participating in the RFS, public and private. As a comprehensive record of forest resources and silvicultural actions, management plans could help simplify tracking how biomass is produced. Without a management plan in place, it can be incredibly difficult, if not impossible, to determine the source of biomass coming from a particular ownership, especially whether it was grown using natural or 'planted' regeneration. Management plans are a key component of FSC certification and other existing forest certification systems.

These two changes would go a long toward simplifying the tracking process and ensuring that the data being tracked are relevant to the sustainability of the management practices being used, instead of just ownership and sourcing.

Question 5. Are you concerned about potential biofuel plants bypassing the United States and ending up building in Canada or elsewhere, especially those wanting to use woody biomass, because of the limitations of the RFS' *renewable biomass* definition?

Answer. Yes, I am very worried about renewable fuel companies deciding to research, develop and commercialize conversion technologies for wood outside of the United States. The RFS language rules out a number of feedstocks, including substantial quantities of woody biomass from both public and private lands. The exclusionary nature of this definition cannot be anything but a disincentive to companies looking to produce wood-based renewable fuels in the United States. It is very prob-

[40] Office of Law Enforcement. "Pacific Region Law Enforcement History." United States Fish and Wildlife Service. *http://www.fws.gov/pacific/lawenforcement/law6.html* (accessed August 12, 2008).

[41] "FSC Standard for Chain of Custody Certification." Forest Stewardship Council, 2004.

able that we will see a migration of capital, technology, and talent to countries that have policies in place to encourage and incentivize this technology. With this loss, we will also lose a great opportunity to develop the declining forest products industry into a robust and competitive industry producing a variety of products, including renewable fuels, from woody biomass. Without such a major turnaround, the production of pulp and timber will likely continue to move offshore.

Canada is one likely destination for biofuels companies wishing to relocate. In December 2006, Rona Ambrose, Canadian Minister of the Environment, announced that the government would regulate the average renewable content of gasoline requiring fuels to contain five percent renewable content by 2010 (essentially a Renewable Fuel Standard).[42] On June 26, 2008, the Canadian Environmental Protection Act was amended to give the government the authority to enact these regulations.[43] Eligible feedstocks were not explicitly defined in the law; however, the legislative summary of the bill authorizing this standard refers explicitly to forest biomass when describing next-generation renewable fuels.[44] If the final Canadian regulation broadly includes woody biomass, as it appears it will, this mandate (along with the enormous forest resource in Canada) will be a huge incentive for companies wishing to produce wood-based renewable fuels.

On top of this, Canada also has a number of funding programs in place to encourage the production of renewable fuels, including Sustainable Development Canada. This program provides funding for a number of renewable energy companies, including Woodland Biofuels, Inc, based out of Ontario. Woodland Biofuels is currently planning to construct a 20 million gallon per year cellulosic biofuel facility utilizing woody biomass. The facility will be partially funded by $9.8 million in assistance from Sustainable Development Technology Canada.[45] Iogen Corporation is another Canadian biofuels company receiving funding under this program. In 2007, Iogen received an $80 million grant from the U.S. Department of Energy to construct a commercial-scale cellulosic biorefinery in Shelley, ID using wheat straw as the primary feedstock. However, in June of 2008 Iogen suspended its operations in Idaho in favor of constructing a facility in Canada. Iogen's reasoning for the move was that DOE failed to convince investors that $250 million in loan guarantees would be appropriated.[46–48] According to Iogen, the NextGen Biofuels Fund, established by Sustainable Development Technology Canada in coordination with the Canadian government, will support up to 40 percent of eligible project costs.[49] This is one specific example of a facility moving to Canada because of the *greater value and reliability of the overall incentive package* offered there.

Outside of Canada, there are a number of examples of renewable energy corporations moving operations or shifting exports from one country to another one offering better incentives. In 2006, Abengoa Bioenergy, Inc. opened a pilot cellulosic biorefinery in Salamanca, Spain, co-located with an existing starch-based ethanol facility.[50] Production at this facility was halted in September of 2007 due to the lack of a biofuels mandate or sufficient incentives in Spain. Abengoa was forced to export its product to other countries in Europe at increased costs. However, with a law going into effect in 2009 obligating the use of biofuels, production was able to resume in July of 2008. According to Abengoa, measures such as this resulting in a

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[42] ecoACTION. "Canada's New Government takes new step to protect the environment with Biofuels." Government of Canada. *http://www.ecoaction.gc.ca/news-nouvelles/20061220-eng.cfm* (accessed August 14, 2008).

[43] ecoACTION. "The Government of Canada Biofuels Bill Receives Royal Assent." Government of Canada. *http://news.gc.ca/web/view/en/index.jsp?articleid=407879* (accessed August 14, 2008).

[44] Parliamentary Information and Research Service. "Bill C–33: An Act to Amend the Canadian Environmental Protection Act, 1999." Parliamentary Information and Research Service. 2007.

[45] Woodland Biofuels, Inc. "Woodland Biofuels—Engineering Almost Complete." *http://www.woodlandbiofuels.com/d-4-ournews.htm* (accessed August 11, 2008).

[46] Ellis, Sean. "Iogen Suspends Operations in Idaho." Idaho Farm Bureau Federation. *http://www.idahofb.org/news/news.aspx?n=n&id=15507* (accessed August 11, 2008).

[47] Fehrenbacher, Katie. "Iogen Suspends U.S. Cellulosic Ethanol Plant Plans." Earth2Tech. *http://earth2tech.com/2008/06/04/iogen-suspends-us-cellulosic-ethanol-plant-plans/* (accessed August 14, 2008).

[48] "Iogen Nixes Idaho for Ethanol Plant, Picks Saskatchewan." Soyatech. *http://www.soyatech.com/news_story.php?id=8326* (accessed August 14, 2008).

[49] "Major Step Forward for Proposed World Leading Ethanol Biorefinery in Canada." Iogen Corporation. 2008.

[50] Abengoa Bioenergy. "Biocarburantes de Castilla y Leon Commences Production with Home Produced Raw Material." Abengoa Bioenergy. *http://www.abengoabioenergy.com/sites/bioenergy/en/acerca_de/sala_de_prensa/historico/2006/20060707_noticias.html* (accessed August 14, 2008).

stable market are necessary to provide the financial resources to develop advanced renewable fuels.[51] Abengoa also operates a number of biorefineries in the United States, including several pioneering the use of cellulosic feedstocks. Since the RFS excludes most woody biomass from the RFS, however, Abengoa may find itself in a similar situation to the one they faced in Salamanca and may decide to leave the country or export the fuel overseas. This export of fuels and products overseas should be seen as wasted opportunities. The value of these products would otherwise re-circulate within the domestic economy, providing local jobs and adding value to other local industries.

Abengoa is also involved in a number of solar energy projects. Abengoa Solar Inc. currently has a proposal to build a 280 MW solar power plant in Arizona. However, with renewable energy tax credits set to expire at the end of this year, according to Abengoa, this facility will not be built in Arizona or anywhere in the United States. Kate Maracas, vice president of Abengoa's Arizona operations, has stated "Without the 30 percent investment tax credit, the numbers simply don't work. So we can't get project financing."[52] On the same day this story was published, Abengoa announced that it had completed financing worth €280 million for the construction of four solar projects in Spain.[53] Abengoa is looking to develop solar projects in other locations, including Algeria and Morocco.[54] This is a different technology and a different incentive, but the principle is the same. If we are not willing or able to offer reliable, effective incentives for renewables, we will lose the technology, capital, and talent to those countries that do.

In another example, SunPower Corporation, a U.S. supplier of solar cells and panels, has stated that they may have to move some business overseas if renewable energy tax credits are not extended. SunPower Chief Executive Officer Tom Werner in an interview stated, "We control our own destiny, (and) we'll be able to enter other new markets rapidly, and we believe we can hold our guidance for 2008 and 2009, even if the ITC doesn't pass, by moving business elsewhere." SunPower expects to have its sales to the business market affected the most; however, there are plans to expand business overseas in countries like Italy, Greece, France, and Australia.[55] On August 14, 2008, Pacific Gas & Electric signed an agreement with SunPower and Topaz Solar Farms LLC to supply a combined 800 MW of renewable energy. According to the press release, both projects are contingent on the renewal of the Federal energy tax credit.[56]

The global trade in wood pellets is another example of resources relocating to follow a needed incentive—this time the package of climate change laws and incentives in the E.U. According to a study published in the *Forest Products Journal,*[57] the bulk of wood pellets produced in North America in 1997 were sold on the domestic market. In the decade since that study was published, the market situation has changed. While there is still local demand for wood pellets, there is a larger market evolving in Europe where climate change legislation has created incentives for power companies to boost their use of renewable resources. Europe already consumes nearly 8 million tons of wood pellets a year to run factories and power plants and heat entire neighborhoods, and that amount is still increasing. In response to this rising demand, a number of American and Canadian pellet producers have begun shifting their focus to export sales on the European markets. Corinth Wood Pellets LLC in Corinth, Maine recently began operation in central Maine. Another Maine company, Maine Wood Pellets Company, hopes to begin operating soon. Together, the two will be able to produce over 1 million tons of wood pellets a year,

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[51] Abengoa Bioenergy. "Biocarburantes de Castilla y León informs." Abengoa Bioenergy. *http://www.abengoabioenergy.com/sites/bioenergy/en/acerca—de/sala__de__prensa/historico/2008/20080716__noticias.html* (accessed August 14, 2008).

[52] Fischer, Howard. "Solar-Power Plant Hinges on Congress." ARIZONA BUSINESS GAZETTE. *http://www.azcentral.com/business/abg/articles/2008/08/07/20080807abg-solar0807.html* (accessed August 14, 2008).

[53] Abengoa Solar, Inc. "Abengoa Solar Completes Financing for New Solar Projects Worth More Than ?280 million." Abengoa Solar, Inc. *http://www.abengoa.es/sites/abengoa/en/noticias__y__publicaciones/noticias/historico/noticias/2008/08__agosto/20080807__noticias.html* (accessed August 14, 2008).

[54] Grimm, Ryan. "McCain Absence Could End Arizona Project." POLITICO. *http://www.politico.com/news/stories/0708/12159.html* (accessed August 14, 2008).

[55] Daily, Matt. "SunPower View Solid Despite Tax Credit." Reuters UK. *http://uk.reuters.com/article/oilRpt/idUKN0337143820080603?sp=true* (accessed August 14, 2008).

[56] SunPower Corp. "PG&E Signs Historic 800 NW Photovoltaic Solar Agreements with OptiSolar and SunPower." SunPower Corp. *http://investors.sunpowercorp.com/releasedetail.cfm?ReleaseID=328221* (accessed August 14, 2008).

[57] Aruna, P.B., Larman, J.G., Araman, P., and F.W. Cubbage. 1997. *An analysis of wood pellets for export: a case study of Sweden as an importer.* FOREST PRODUCTS JOURNAL 47(6): 49–52.

a substantial portion of which are destined for the European market. Energex Pellet Fuel, Inc., another company focusing on export, currently bills itself as North America's largest pellet fuel maker, producing 200,000 tons a year from plants in Quebec and Pennsylvania. In the southern part of the country, both Dixie Pellets, LLC, located near Selma, Alabama and Appling County Pellets, LLC in Baxley, Georgia plan to begin exporting pellets to meet European demand. Green Circle Bio Energy in Jackson County, Florida, owned by a Swedish company, is building a plant with the capability of producing 560,000 tons a year, primarily for the European market. Green Circle Bio Energy calls it the largest wood pellet plant in the world. Our inexpensive wood resources are attractive to other nations beyond Europe, as well. In the past year, Green Energy Resources, Inc. announced a 5 yr., $144 million dollar contract to export rough wood chips to China for use in power production.

These are just a few examples—many more could be found within the renewable energy industry and other industries as well. There will always be a strong economic push for any company to locate where they have access to adequate and reliable incentives, encouraging policies, and minimal barriers to the production of particular products or the use of particular resources. From an economic competitiveness and a natural security perspective, it should be a national imperative to encourage the development of renewable technologies and implementation of renewable energy, including wood-based biofuels, right here on our own shores. If we miss out on these opportunities, future generations of Americans will be saddled with the choice between importing foreign fuels and licensing foreign technology. Either way, the United States risks becoming even more dependent on other countries for our most basic (and strategic) needs.

From an environmental perspective, as well, we should strive to have our biofuel feedstocks produced on American soil, where we can regulate and oversee the production. We have in this country a wide variety of laws and regulations at the Federal, state, and local levels protecting against a great number of unsustainable practices and environmentally-damaging activities. Furthermore, we are blessed with a judicial system that is able and willing to enforce these laws. Comparatively, many countries have lower or non-existent environmental standards, and where these standards do exist, they are often ignored by the courts. Corrupt officials, insufficient resources, and recalcitrant cultures often render environmental regulations entirely ineffective.

In a world of finite and dwindling fossil fuels, increasing global conflict over energy, and greater and greater concern over the dangers of global climate change, renewable energy **is** the future. For reasons of national security, economic competitiveness, and environmental sustainability, it is essential that we commit ourselves to developing renewable technologies here in America and providing the adequate and reliable incentives needed to make that happen. For that reason, the Congress should amend the *renewable biomass* definition to include the full range of renewable biomass resources that we have at our disposal.

RESPONSE TO QUESTIONS SUBMITTED TO ARTHUR "BUTCH" BLAZER, FORESTER, STATE OF NEW MEXICO; EXECUTIVE MEMBER, COUNCIL OF WESTERN STATE FORESTERS; EXECUTIVE MEMBER, NATIONAL ASSOCIATION OF STATE FORESTERS

Question 1. In recent years there has been an increase in the quantity, intensity and overall scope of forest fires, particularly in the western United States. What is the Forest Service doing now to remove excess fuels from public forests, and how could the Renewable Fuel Standard (RFS) facilitate this practice?

Answer. We will start by discussing a significant hurdle before the agency which must be fixed. The Forest Service's ability to respond to the increasing number and intensity of large, catastrophic wildfires by removing excess fuels has been severely hampered by increasing fire suppression costs. The agency's first priority is to protect human life and property which often means fighting fires in the Wildland-Urban Interface. Fighting fires near homes and communities is expensive and is one of the lead contributing factors to the agency's escalating annual fire suppression costs. The Forest Service now spends over half its budget on fire suppression and is repeatedly forced to borrow from other internal accounts (e.g., S&PF) including those designed to proactively remove hazardous fuels from NFS and other public and private forestlands. Help is needed from Congress to fix this fire "borrowing" situation, not only to repay borrowed funds but to secure a long term fix by passing the House Natural Resources Committee markup version of the FLAME Act (H.R. 5541).

It is important to mention the need to address all at-risk lands in the discussion of excess fuels and forest health. The USFS and State Foresters have partnered on

a competitive funding process for State & Private Forestry funds to ensure that the most at-risk areas or projects that will have the greatest impact will be funded. This is a key step in the right direction as many of the State & Private Forestry programs, such as State Fire Assistance, can reduce the costs of wildland fire suppression activities in the long run.

Now let us turn our attention to activities of the USFS specific to public lands. The Forest Service has entered into various public-private partnerships and utilized nontraditional contracting authorities (i.e., stewardship contracts) aimed at promoting landscape-scale fuels reduction and forest health projects. In 2003, Congress granted the Forest Service (and BLM) full authority to enter into multiyear stewardship contracts on a "best-value" basis and allowed the agency to exchange "goods" for "services" (among other authorities).

Success stories have emerged on the Lakeview Federal Stewardship Unit (i.e. Bull Stewardship Contract) and the Apache-Sitgreaves National Forest (i.e., White Mountain Stewardship Contract), yet few stewardship contracts have provided the long term wood supply needed to attract significant attention of investors interested in funding new wood-bioenergy or cellulosic ethanol facilities. Investors are most interested in multi-year (i.e., 10 or more years), landscape level stewardship contracts, but a number of obstacles (e.g., cancellation ceilings, threat of litigation, diverted fire suppression funds) remain which prevent wide-spread use of stewardship contracts—and other cross boundary authorities—on NFS lands and leave a significant number of acres threatened by devastating wildfire.

The RFS in the Energy Independence and Security Act (EISA) established a national goal to reach 36 billion gallons of renewable fuels by 2022. To help meet this target, Congress has followed by providing policy incentives—such as the 2008 Farm Bill's $1.01/gallon credit towards the production of cellulosic ethanol—designed to help launch new markets for woody biomass which also hold enormous potential for driving down the cost of fuel reduction treatments on both public and private forestlands. Unfortunately, the current definition of *renewable biomass* in the RFS section of the EISA excludes fiber from Federal (and significant private) forestland and thwarts future investment in conversion technologies which currently are at (or near) operational or economical production.

Changing the *renewable biomass* definition could dramatically increase market development particularly in western states where over 40 percent of land is federally held and forest health and fuel reduction treatments are completed at a net cost to the Forest Service. As an example, after 3 years of gathering data on the White Mountain stewardship contract in Arizona, the results reveal that over 33% of the material harvested remain in the forest and requires the Forest Service to pile and burn. Regarded as forest residual, there is no current market for this material, which some estimates believe could account for as much as 45% of a landscape scale forest restoration or fuel reduction project. To reach our forest health and wildfire management goals, there must be a market for this wood.

The exclusion is overly restrictive—particularly in light of the extensive network of Federal environmental laws (e.g., NEPA, NFMA) which prevent the conversion of native forests to dedicated woody biomass feedstocks—and provides little relief to cover the rising costs of forest health and fuel reduction treatments at a time when warming climates and limited budgets suggest it is needed most.

Question 2. Do you think it is possible to achieve fire management objectives without removing biomass from Federal lands?

Answer. No, in order for management objectives to be effective, activities must happen across the landscape, including Federal, state, private and tribal lands. Federal lands in particular are overly dense. Despite good intentions, for nearly a century Federal land managers held the philosophy of suppressing all wildfires. This has contributed to widespread conditions of unhealthy, overly-dense forests now at risk of high-severity, stand-replacing wildfires. Estimates suggest there are 90 million acres at risk of high-severity fire and devastating insect and disease outbreaks. *The backlog of badly needed treatments has exposed over 50,000 communities to risks of losing life and property.*[1] One of the contributing factors to the increase in unhealthy forests is the changing climate. This trend is not expected to reverse and will continue to impact the ability for fire management objectives on the landscape.

To determine whether it is possible to achieve fire management objectives without removing woody-biomass, The Council of Western State Foresters request you consider the following options:

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[1] National Association of State Foresters. 2007. *Communities at Risk Report FY 2007*. Last Accessed online at: *http://www.stateforesters.org/files/NASF-finalCAR-report-FY07.pdf*.

- **Do nothing approach.** Some argue that allowing nature to "run its course" might be the least costly alternative, while others suggest hidden costs are buried in the price of fighting fires and the loss of ecosystem services. Consider, for instance, the $238 million price tag tied to the 138,000 acre Hayman Fire which occurred in 2002 and consumed 144 homes and 466 outbuildings. These costs do not include the subsequent $8 million needed to remove fire-related debris from critical reservoirs which supply Denver residents with clean drinking water.[2] If left to chance, forests will eventually burn—in some cases—with devastating impacts on their ability to provide for a number of important public values.
- **Prescribed Burn.** Reducing hazardous fuels using prescribed burns may work in certain situations, but high fuel loads, air quality restrictions, short windows of appropriate weather and risk of escape into the Wildland-Urban Interface often constrain managers' ability to effectively utilize this option across the landscape.[3] It has its' place, but it is not a panacea alone. Costs tied to prescribed burning can quickly escalate particularly in the West where fire-line construction in mountainous terrain is expensive. Other costs include mop up requirements, potential damage from escape, smoke management, and safety.[4]
- **Mechanical Treatments.** Mechanical treatments designed to remove residues or small diameter trees are often completed at a net-cost to the Forest Service, yet are a small price to pay when compared to fighting uncontrolled wildfire. These costs vary widely and are affected by numerous factors including site conditions, treatment requirements, labor rates, machines costs, fuel costs and other considerations.[5] Where markets exist for previously unmerchantable, small-diameter material, mechanical treatments have the potential to reduce or possibly eliminate treatment costs. Therefore, it is extremely important that we consider appropriately scaled expansion wood-based markets.

Litigation (or the threat thereof) of mechanical treatments, lack of industry capable of utilizing woody-biomass, dwindling budgets being diverted to fire suppression, and numerous other factors prevent Federal land managers from actively achieving fire and forest management objectives that will reduce risks to communities. Recognizing biomass from Federal lands in any RFS is a significant first step in creating the markets needed to drive down treatment costs and help the Forest Service and other Federal and state land management agencies address the significant backlog in fuels reduction activities.

Question 3. What are the current barriers to achieving your management goals in your state? How important is a market, such as the one that could be created by the RFS, in achieving these goals?

Answer. The states manage their forests within a network of various other public and private forests. Each type of ownership is confronted with its own specific management challenges, but collectively they are tasked with providing a number of essential public services including carbon sequestration, renewable energy, timber, clean air and abundant water, and wildlife habitat amongst others. The states face very similar issues as their Federal agency counterparts including limited available budgets to address forest health threats such as uncharacteristically large wildfires and insect and disease outbreaks. In addition, states are charged with helping their neighboring private forest landowners who face on-going pressures to convert their land to non-forest uses.

The RFS can help address many of the barriers which stand in the way of states' ability to meet their forest management objectives. First, it can help generate critical markets for woody biomass and provide new income sources for families and individuals helping them cover their costs in owning, maintaining and protecting their forest from wildfire. Keeping forestlands forested is a primary driver for our policy positions. Second, new markets are accompanied by new industry and an opportunity for communities to provide family-wage jobs and diversify their economies. Third, it provides new opportunities for land managers to treat more "at-risk" acres

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[2] LeMaster, D.C. et al. 2007. *Protecting Front Range Watersheds from High-Severity Wildfires.* Last accessed on August 19, 2008 at: *http://www.pinchot.org/current_projects/sustainable/watersheds.*

[3] Barrett, T.M., Jones, J.G., and Wakimoto, R.H. 2000. *USDA Forest Service use of spatial information in planning prescribed fires.* WESTERN JOURNAL OF APPLIED FORESTRY. 15: 200–207.

[4] Cleaves & Brodie. 1990. Economic Analysis of prescribed burning, *In* Natural & Prescribed Fire in Pacific Northwest Forest, J.D. Walstad, et al (eds.) Oregon State University Press, Corvallis.

[5] Rummer, B. 2008. *Assessing the cost of fuel reduction treatments: A critical review.* Last accessed on August 19, 2008 at *http://www.srs.fs.usda.gov/pubs/ja/ja_rummer017.pdf.*

at a time when limited budgets restrict their ability to proactively address forest health concerns.

New opportunities for both public and private forestlands are emerging through the use of wood-bioenergy or cellulosic ethanol, but a number of barriers need to be addressed before they are fully realized including:

- **Limited Markets.** In the West, markets have been slow to develop as supply from Federal lands has been limited. Demand has been curtailed as renewable energy investors and lenders hesitate to put forward the significant capital required for a new wood-bioenergy or cellulosic ethanol facility without some assurance of a stable, multi-year supply. Further, high transportation costs limit the economic feasibility of any new investments in woody-biomass facilities. Without these markets and related infrastructure, states are forced to cover the full cost of removing small-diameter materials which threaten forests and surrounding communities.
- **Limited technical and financial assistance.** Rural communities are in need of programs which can help overcome a lack of resources needed to attract new forest-based businesses and diversify their local economies. In particular, technical and financial assistance programs that are tailored to woody-biomass utilization would be helpful.
- **Cheaper energy alternatives.** Competing renewable and non-renewable energy sources are oftentimes less expensive and can hold a competitive advantage over woody-biomass utilization. But woody biomass should not be written off. Rather, attention should be placed on the thermal advantages of woody bioenergy options and the baseload advantages and dispersed nature of the energy source to help ensure a stable, consistent and widely applied renewable energy. To this end, we strongly encourage the Committee to look at renewing and extending the Production Tax Credit (PTC) for biomass energy sources for as long as possible. We also encourage the PTC being adjusted so all the renewable energy sources are treated equitably under the PTC. As it currently stands, each renewable garners different credits. Consistency in this policy will foster private sector investment.

In sum, an RFS is extremely important in helping states (and other landowners) in achieving their forest management objectives. These opportunities will not be fully realized across all the nation's forests—but particularly in the West—until the woody-biomass definition in the RFS is changed to recognize woody biomass from Federal sources.

RESPONSE TO QUESTIONS SUBMITTED TO KENNETH G. CASSMAN, PH.D., DIRECTOR, NEBRASKA CENTER FOR ENERGY SCIENCES RESEARCH; PROFESSOR, DEPARTMENT OF AGRONOMY AND HORTICULTURE, UNIVERSITY OF NEBRASKA-LINCOLN

Questions from Hon. Stephanie Herseth Sandlin, a Representative in Congress From South Dakota

Question 1. What is your opinion of the general concept of *indirect land use change* and how would you characterize the current level of scientific understanding of this issue?

Answer. The current level of scientific understanding of indirect land use change (ILUC) caused by expansion of biofuel production capacity is very poor (more detail provided in the answer to *Question 3* below).

The general principle behind the concept of ILUC is that anything which results in higher prices for major staple food crops encourages farmers worldwide to expand production of those crops so they can profit from the high prices. Expansion of production capacity can occur in two ways—either by increasing yields on existing farm land, or by increasing the amount of land in production. When new land is cleared for crop production, there is a release of substantial amounts of greenhouse gases to the atmosphere because natural ecosystems such as forests, wetlands, and grasslands contain large amounts of stored carbon in their biomass and soil.

The ILUC concept runs into serious problems when extended consistently to other issues. This is because anything that reduces the yield or total output of food crops on existing farm land would incur a GHG emissions "debt" due to ILUC. For example, organic grain producers would have an ILUC "debt" if they used crop rotations with forage legumes and cover crops to maintain soil fertility without commercial fertilizers because food output would be less than from conventional cropping systems that produce grain crops every year. Likewise, a corn-soybean rotation may incur an ILUC debt compared to continuous corn if the total amount of food, feed,

and biofuel feedstock is greater in continuous corn and contributes to lower commodity prices. Conversely, anything that increases crop yields on existing farm land would be eligible for a GHG offset because it helps avoid ILUC. The bottom line is that the concept of indirect land use change is not useful for application to production agriculture when applied broadly to a wide range of farming systems because it would have negative effects on diversity, stability, environmental quality, and profitability of U.S. agriculture.

Question 2. How much confidence do you have in our current abilities to accurately estimate the greenhouse gas impacts of indirect land use change?

Answer. Numerous research papers have been published on the factors that influence land use change (LUC). Consistently these papers identify a large number of factors that affect it, and they note these factors interact in complex ways. Use of a model that only evaluates the impact of increased biofuel production capacity avoids the need to deal with this complexity, and predictions from such a model are not realistic. It is worthwhile to note that the Roundtable on Sustainable Biofuels (*http://cgse.epfl.ch/page65660.html*), which represents a wide range of international researchers, government officials, industry, and environmental advocacy organizations, has concluded there are no broadly accepted methods for estimating ILUC.

Question 3. Can you elaborate on the difficulties of accurately quantifying indirect land use change and assigning the greenhouse gas emissions that result from these changes?

Answer. There are many factors, in addition to biofuels, that influence land use change (LUC). These include currency exchange rates, land use policies in major crop producing countries worldwide, economic growth rates in developing countries and the impact on human diets, the rate of growth in crop yields on existing farm land, and so forth. It is very difficult to predict each of these factors and their interactions with current knowledge and models. Therefore, any model estimate of future ILUC due solely to biofuels is confounded by the underpinning assumptions about the other factors listed above as simulated in the model, regardless of whether these assumptions are explicit or implicit. The bottom line is that any estimates of ILUC are highly uncertain and therefore do not provide a reasonable foundation for policy development.

Question 4. Is there any empirical proof to date that biofuel expansion has caused significant land use change? Aren't farmers cultivating considerably fewer acres today than they did 20–30 years ago?

Answer. There is no empirical evidence that, to date, the expansion of biofuel production has caused land use change. However, this statement is backward looking in that it is based on the recent past and current situation. The key issue going forward is whether there will be significant direct and indirect LUC due to continued expansion of biofuel production capacity in the U.S. and other countries. The answer to this question depends on how much biofuel production capacity is established. For example, if corn ethanol production rises to 15 billion gallons per year, it will be difficult to meet demand for producing this biofuel as well as for livestock feed, sweeteners, and bio-based industrial products without a large expansion of crop area, both here in the U.S. and elsewhere, unless there is an acceleration in the rate of yield increase on existing farm land (see answer to *Question 6* below).

Question 5. According to your modeling efforts at the University of Nebraska, corn ethanol can reduce greenhouse gas emissions by 50% or more compared to gasoline. How and why are your results different than those from scientists that suggest corn ethanol does not reduce greenhouse gas emissions?

Answer. The most widely used models for estimating the lifecycle greenhouse gas (GHG) emissions from corn grain ethanol (hereafter called corn ethanol) are the GREET (*http://www.eurekalert.org/pub_releases/2008-05/dnl-ngm050808.php*), EBAMM (*Science* 2006, Vol. 311:506–508), and BESS models (*www.bess.unl.edu*). Of these, GREET and EBAMM use older data for corn yields and input levels, energy requirements of the ethanol plant, and the way in which co-products are used and credited. In contrast, the BESS model uses the most currently available data for these lifecycle components, which better reflects the actual performance of the ethanol industry today.

I therefore believe the BESS model provides the most accurate representation of the corn ethanol industry as it currently functions with regard to land requirements and GHG emissions. As such, I would also argue that this more up-to-date GHG performance should be used by EPA in developing its GHG emissions thresholds for corn ethanol, and also by states that are implementing low carbon fuel standards.

Question from Hon. Tim Holden, a Representative in Congress From Pennsylvania

Question. You mention more work needs to be done on production scale in order to get the best science on feedstocks, but that would be quite a financial undertaking. Is industry poised to contribute and help finance research facilities?

Answer. There are two key issues that must be addressed to provide unequivocal scientific evidence that existing corn-ethanol and second generation cellulosic biofuels are environmentally sustainable and contribute to a reduction in GHG emissions compared to gasoline, the latter now mandated in the 2007 EISA.

The first issue concerns the food *versus* fuel competition, and the need to avoid a substantial increase in food costs due to use of corn or dedicated non-food cellulosic crops for biofuel production. In the case of corn, current yields and rates of yield increase in *are not sufficient* to meet expected demand for food, feed, and biofuels if annual U.S. corn ethanol production reaches 15 billion gallons by 2015. Without a substantial acceleration in corn yields on existing land, corn prices will rise to levels that threaten the economic viability of both the corn ethanol and livestock industries.

But it is not just a matter of more rapidly increasing yields because we must achieve such acceleration while also protecting water and soil quality and while reducing GHG emissions from corn production. *Thus, the second issue is how to achieve this "ecological intensification" process.* In fact, we have never been successful at both raising yields quickly and reducing the environmental impact of agriculture, and it is a major scientific challenge for which there are no silver bullets. Instead, as our work in Nebraska has shown, it can be done through an integrated, interdisciplinary research effort that has an *explicit focus on both* accelerating yield gains and improving the environmental performance of corn production systems. Note also that accelerating yield gains on existing farm land will also reduce, and even eliminate concerns about ILUC.

In the case of dedicated cellulosic biofuel crops like switchgrass, there is a critical need to conduct similar research to identify how to maximize yields on marginal land so as to avoid use of land that can produce food crops while also protecting soil and water quality. Although there has been some promising research at a relatively small scale that suggests it is possible to achieve both goals, it is not possible to scale up to a commercially viable system. And this scaling constraint is also true for similar research on corn ethanol.

Therefore, for corn ethanol, switchgrass, or any other promising biofuel system it is critical to conduct research in production-scale fields to determine if it is possible to produce adequate amounts of these feedstock crops while also protecting the environment, and reducing GHG emissions relative to gasoline based on lifecycle analysis. Monitoring changes in soil carbon sequestration is a critical component of this work, as is model development to extend and extrapolate the results to all environments in which the biofuel crop may be grown.

I have described the type of research that is needed in my original written testimony. Unfortunately, such research is not low cost because it requires sophisticated instrumentation and scientists from a wide range of plant, soil, and environmental sciences. I estimate it would require a concerted effort for the next 5–10 years involving about $150 million per year. While this is clearly a lot of money, it represents only a small fraction of the total amount of Federal funding allocated to research and development of second generation biofuels. It is "public goods" research in the sense that its primary goal is to ensure the long-term environmental and economic sustainability of the emerging biofuel industry rather than to develop intellectual property or products for short term profit in the private sector. Therefore, it is not likely the private sector will volunteer to fund this work. One option is for a national research fund derived from a half-cent check-off on the sale of each gallon of biofuel. Such a fund would provide $5 million dollars per year for every billion gallons of biofuel production, and could be matched by Federal funding from the DOE, USDA, and EPA to ensure adequate funds to perform the required research.